APL2

Installation and Customization under TSO

Version 2 Release 2

SH21-1055-01

APL2

Installation and Customization under TSO

Version 2 Release 2

SH21-1055-01

Note!

Before using this information and the product it supports, be sure to read the general information under “Notices” on page vii.

Second Edition (March 1994)

This edition replaces and makes obsolete the previous edition, SH21-1055-0. The technical changes for this edition are summarized under “Summary of Changes,” and are indicated by a vertical bar to the left of a change.

This edition applies to Version 2 Release 2 of APL2, 5688-228, Release 2 of APL2 Version 2 Application Environment, Program Number 5688-229, and to any subsequent releases until otherwise indicated in new editions or technical newsletters. Make sure you are using the correct edition for the level of the product.

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Programming Interface Information

This installation guide is intended to help you install APL2 Version 2 on MVS under TSO.

This book also documents Product-sensitive Programming Interface and Associated Guidance Information provided by APL2.

Product-sensitive programming interfaces allow the customer installation to perform tasks such as diagnosing, modifying, monitoring, repairing, tailoring, or tuning of APL2. Use of such interfaces creates dependencies on the detailed design or implementation of the IBM software product. Product-sensitive programming interfaces should be used only for these specialized purposes. Because of their dependencies on detailed design and implementation, it is to be expected that programs written to such interfaces may need to be changed in order to run with new product releases or versions, or as a result of service.

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End of Product-sensitive programming interface

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About This Book

This book is intended to assist you in installing IBM* APL2* under TSO.

Who Should Read This Book

This book, *APL2/370 Installation and Customization under TSO*, is for the system programmer or administrator responsible for installing and customizing the APL2 Licensed Program, or APL2 Application Environment, under TSO. It assumes that you are familiar with the MVS/System Product (MVS/SP*) environment, have experience with the installation of licensed programs such as APL2, and have experience with Job Control Language (JCL), the Time Sharing Option (TSO), and the System Modification Program (SMP).

This book tells you how to install APL2, tailor the system to meet your installation's requirements, and maintain APL2. It summarizes the major features of APL2 and describes the sequence of tasks you should follow to install, customize, and maintain APL2 under TSO.

APL2 Publications

Figure 1 lists the books in the APL2 library. This table shows the books and how they can help you with specific tasks.

Figure 1 (Page 1 of 2). APL2 Publications

Information	Book	Publication Number
General product	*APL2 Fact Sheet*	GH21-1090
Warranty	*APL2/370 Application Environment Licensed Program Specifications*	GH21-1063
	APL2/370 Licensed Program Specifications	GH21-1070
	APL2 for AIX/6000 Licensed Program Specifications	GC23-3058
	APL2 for Sun Solaris Licensed Program Specifications	GC26-3359
Introductory language material	*APL2 Programming: An Introduction to APL2*	SH21-1073
Common reference material	*APL2 Programming: Language Reference*	SH21-1061
	APL2 Reference Summary	SX26-3999
System interface	*APL2/370 Programming: System Services Reference*	SH21-1056
	APL2/370 Programming: Using the Supplied Routines	SH21-1054
	APL2/370 Programming: Processor Interface Reference	SH21-1058
	APL2 for OS/2: User's Guide	SH21-1091
	APL2 for Sun Solaris: User's Guide	SH21-1092
	APL2 for AIX/6000: User's Guide	SC23-3051
	APL2 GRAPHPAK: User's Guide and Reference	SH21-1074
	APL2 Programming: Using Structured Query Language	SH21-1057
	APL2 Migration Guide	SH21-1069

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Figure 1 (Page 2 of 2). APL2 Publications

Information	Book	Publication Number
Mainframe system programming	*APL2/370 Installation and Customization under CMS*	SH21-1062
	APL2/370 Installation and Customization under TSO	SH21-1055
	APL2/370 Messages and Codes	SH21-1059
	APL2/370 Diagnosis Guide	LY27-9601

For the titles and order numbers of other related publications, see the "Bibliography" on page 204.

Conventions Used in This Library

This section discusses the conventions used in this library

lower Lowercase italicized words in syntax represent values you must provide.

UPPER In syntax blocks, uppercase words in an APL character set represent keywords that you must enter exactly as shown.

[ ] Usually, brackets are used to delimit optional portions of syntax; however, where APL2 function editor commands or fragments of code are shown, brackets are part of the syntax.

[*A* | *B* | *C***]** A list of options separated by | and enclosed in brackets indicates that you can select one of the listed options. Here, for example, you could specify either *A*, *B*, *C*, or none of the options.

{*A* | *B* | *C***}** Braces enclose a list of options (separated by |), one of which you must select. Here, for example, you would specify either *A*, *B*, or *C*.

... An ellipsis indicates that the preceding syntactic item can be repeated.

{}... An ellipsis following syntax that is enclosed in braces indicates that the enclosed syntactic item can be repeated.

The term *workstation* refers to all platforms where APL2 is implemented except those based on System/370* and System/390* architecture.

Throughout this book, the following product names apply:

Product Name	Platform
APL2/2	OS/2*
APL2 for Sun Solaris	Sun** Solaris**
APL2/6000*	AIX/6000*
APL2/370	MVS or VM
APL2/PC	DOS

Summary of Changes

Product

APL2/370, Version 2 Release 2

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Form of Publication: Revision, SH21-1055-01

Document Changes

- Updated all references to version and release levels.
- Added planning information for GDDM*.
- Added NLT invocation option.

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Chapter 1. Overview of APL2 and the Installation Process

This chapter summarizes the major features and components of the APL2 Licensed Program, and provides an overview of the installation process.

APL2

APL is a general purpose programming language used in a variety of applications, such as commercial data processing, systems design, prototyping, and scientific and engineering computations. APL2 is an implementation of APL that generalizes many of its fundamental concepts, extends many APL functions and operators, and removes many restrictions present in other implementations of APL.

APL2 consists of a language processor and supporting services. The language processor includes operations for manipulating APL2 data and data structures. The supporting services allow interaction with the host system, data management, and error handling.

Most APL2 installations support APL2 programming as well as personal computing and APL2 applications. A careful selection of the options for installing and customizing APL2 allows you to accommodate the requirements of various user groups.

APL2 Application Environment is a subset of the APL2 Licensed Program that provides the APL2 environment necessary to run prewritten APL2 application packages.

APL2 Application Environment:

- Provides the ability to run applications that have been packaged using the APL2 full product.
- Can be used as an alternative to APL2 in those installations or systems where development facilities are not required.

The following facilities, provided with APL2, are **not** available with APL2 Application Environment:

- The session manager
- The editors
- The library workspaces
- Certain system commands
- Certain external routines
- Shared variable interpreter interface

Information that does not apply to APL2 Application Environment is noted within the text.

The Installation Process

To install APL2, you must do three things:

Plan the Installation

You should complete a thorough installation plan before installing APL2. This involves ensuring that system and storage requirements have been met, deciding how APL2 is installed, and completing all preinstallation

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tasks. For more information on developing your plan, see Chapter 2, “Planning the Installation of APL2” on page 3.

Install the APL2 Licensed Program

The System Modification Program (SMP) handles the installation of APL2. Instructions for both required and optional installation steps are provided in Chapter 3, “Installing APL2” on page 26.

Customize APL2

In order for you to install APL2 successfully, some aspects of its operation may be modified, either during or after installation, to meet user requirements. Other aspects can be modified as needed. Chapter 5, “Customizing APL2” on page 67, discusses these options in detail.

After installation, VS APL users may need to migrate individual VS APL workspaces and files to APL2. This process is detailed in *APL2 Migration Guide*.

You have to provide some ongoing support after APL2 has been installed. System administration includes such tasks as running the Global SVP Service Machine, documenting problems, applying preventive service with PUT, applying corrective service with Program Temporary Fixes (PTFs), adding user-written auxiliary processors or external routines, and providing a local greeting message. Chapter 6, “Administering the APL2 Environment” on page 78 provides you with information on administering APL2 to ensure efficient operation.

Chapter 2. Planning the Installation of APL2

You should complete a thorough installation plan prior to the installation date. The plan helps you ensure a successful installation of APL2. This chapter discusses the information you need to begin planning and then outlines the system requirements and decisions to be made about APL2 data sets, libraries and their control, system and user information options, auxiliary processors, virtual and auxiliary storage, migration from VS APL, data security, and customizing the system.

Preplanning Activity

This installation guide is supplemented by *APL2 Program Directory*, which comes with your APL2 installation tape from the IBM Software Distribution (ISD) Center. The program directory contains information related to installation activities, such as:

- APL2 Licensed Program Preventive Service Planning (PSP) Upgrade identifier
- Organization and content of the distribution material
- Any required updates to this guide
- A list of any prerequisite Program Temporary Fixes (PTFs)

Before you begin your planning effort, it is important that you check the program directory for updates to the information, check procedures in this guide, and check the RETAIN*/370 Preventive Service Planning (PSP) Facility for a list of prerequisite PTFs. To order the prerequisite PTFs, contact your IBM Support Center.

System Requirements

APL2 runs on the software and hardware products listed below. For more information and updates, see *APL2 Program Directory*.

Software

Under TSO, APL2 runs on the following IBM software systems:

MVS/SP

- Version 1, Release 3 or later, with TSO/E.
- Version 2 (MVS/XA*) for use of the extended architecture with TSO/E.
- Version 3 (MVS/ESA*)
- Version 4 (ESA/390*)

ACF/VTAM*

The ACF level of VTAM* is required, along with the NTO Licensed Program, to support start/stop terminals.

VTAM

Release 1 or 2 of VTAM can be used if only IBM 3767 and 3270 terminals are supported.

NCP

The level of the Network Control Program (NCP) appropriate to the telecommunications access method being used.

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NTO

The Network Terminal Option (NTO) Licensed Program is required to support start/stop terminals with ASCII or Correspondence transmission codes.

The following additional software is required by the installation procedure for APL2:

- SMP/E Release 6 or later.
- Utility Programs IEBGENER, IEBCOPY, IEBUPDTE, IEHMOVE, IEFBR14, and IEWL. IEBIMAGE is also required if IBM 3800 Printing Subsystem fonts are installed.

Use of AP 119 or cross-system shared variables requires TCP/IP Version 2 Release 1 or later.

Use of AP 127, the Structured Query Language (SQL*) auxiliary processor, requires the IBM DATABASE 2* (DB2*) licensed program, Version 2 Release 3 or later.

Use of the DSQCIA external function requires QMF* Version 3 Release 1 or later.

An installation using the following APL2 features requires that the Graphical Data Display Manager (GDDM), Version 2 Release 3 or later, be installed in advance of APL2:

- APL2 session manager.
- APL2 full-screen editor—Editor 2.
- GDDM auxiliary processor—AP 126. Use of Presentation Graphics Feature (PGF) call statements requires installation of PGF.
- Any of the following supplied workspaces: *GRAPHPAK*, *FSM*, *FSC*126, *GDMX*, and *CHARTX*.

Of the GDDM features listed, only the GDDM auxiliary processor, AP 126, is included in APL2 Application Environment.

GDDM supports a variety of displays and terminals. For more information on which terminals are supported and how they are used by GDDM, see *Graphical Data Display Manager (GDDM) and Presentation Graphics Feature (PGF): General Information*.

Hardware

System

APL2 is designed to run on any IBM System/370 or System/390 processor that meets the minimum storage requirements.

Terminals

APL2 under TSO supports the terminals listed below, as well as terminals and terminal emulators that are functionally equivalent. IBM assumes no responsibility for establishing functional equivalency.

- IBM 2741 Communication Terminal with the appropriate APL type element

- IBM 3270 Information Display System family of terminals with appropriate APL features

APL2 can run on the terminals listed above even if they do not have APL features. However, entering and displaying certain APL characters on these terminals requires the APL features listed above. IBM recommends that each installation have at least one terminal equipped with APL features.

If an APL terminal is not available:

- Users are not able to enter or display the APL special characters.
- Editing and correcting APL2 functions is difficult and awkward; functions in the MEDIT workspace are provided to facilitate this task.
- The text of APL2 error messages does not display APL special characters.
- The full range of APL2 capabilities is not available.

Control Units

In order for the APL characters to be available, terminals or terminal emulators with APL features, particularly 3270 family terminals, must be connected to control units that support the APL character set. You should verify that APL features are available and that the proper customizing for APL use has been performed on your installation's control units.

Auxiliary Storage

APL2 uses standard system interfaces to access auxiliary storage. It supports any auxiliary storage devices that are supported by those interfaces.

Determining Where APL2 Components Are to Reside

The sample jobs that IBM provides on the APL2 distribution tape allocate data sets for the APL2 Licensed Program and for the workspaces APL2 users create. For easy reference, listings of all sample jobs appear in Appendix A, “Sample JCL Statements” on page 86. If you do not want to use the default data sets specified in the sample jobs, identify the data sets you use.

Installation Libraries

The installation of APL2 may involve the use of the following types of data sets:

System data sets
Catalogs
APL2 product data sets
APL2 SMP data sets

The data set names and the names and descriptions of the elements affecting them or affected in them are shown in Figure 2.

Figure 2 (Page 1 of 4). APL2 Installation Data Sets

Data Set Name	Member Name	Description	Notes
SYS1.LINKLIB	APL2	Full Product Executor	1b, 30
	APL2AE	Application Environment Executor	1b
	AP2INTRP	APL2 Interpreter	1a

Figure 2 (Page 2 of 4). APL2 Installation Data Sets

Data Set Name	Member Name	Description	Notes
	AP2IPDD2	Interpreter Extensions	1a, 30
	AP2ACRCP	Session manager	1a, 30
	AP2TACTL	TSO Subtask Controller	1b
	AP2TAPV2	Version 2 AP Service Interface	1b
	AP2TNL	Processor 11 Interface	
	AP2XCMAP	C Scalar Result Mapper	
	APL2PI	Calls to APL2 Interface	
	AP2TAPIA	Calls to APL2 Addressability	1b
	AP2TN10	REXX Processor	1a
	AP2TN11	External Routine Processor	1b
	AP2TN12	File Processor	1a
	AP2XNRSS	Processor 11 Distributed Functions	1a
	AP2TNCSR	Data Window Services Functions	1a
	AP2X104	COPY Auxiliary Processor	1a, 30
	AP2X119	TCP/IP Auxiliary Processor	1a
	AP2X120	Session Manager Auxiliary Processor	1a, 30
	AP2X121	APL File Auxiliary Processor	1a
	AP2X126	GDDM Auxiliary Processor	1a
	AP2X127	DB2 Auxiliary Processor	1a
	AP2X211	APL Object File Auxiliary Processor	1a
	AP2TYSTX	TSO Attention Task	1b
	AP2TMEXC	TSO/E CLIST Processor	1b, 29
	AP2PPKG	Packaging Routines Namespace	1a
	AP2PDDT	DISPLAY and TIME Namespace	1a
	AP2PDFMT	Double-Byte Formatter Namespace	1a
	AP2PIVP	Installation Verification Namespace	1a
	AP2PAPIW	Calls to APL2 Namespace	1a
	AP2PPSRV	TCP/IP Port Server Namespace	
	AP2PIDI	IDIOMS Namespace	1a, 30
	AP2PRAPL	Remote-Session Manager Namespace	1a, 30
	AP2TCSVS	Global Shared Variable Processor	2
	AP2TCSVU		29
	AP2TCSVR		
	AP2TCSVP		
	APLYUOPT	VS APL Options Module	25
	SVPEXIT1	Global SVP Installation Exit	2
SYS1.PROCLIB	APL2SVP	Global SVP Startup Procedure	3
	AP2PSMPE	SMP Procedure for APL2 Installation	

Figure 2 (Page 3 of 4). APL2 Installation Data Sets

Data Set Name	Member Name	Description	Notes
	AP2PSRV	Port Server Startup Procedure	24
SYS1.IMAGELIB		Graphic Character Modification Tables, 3800-1 and 3800-2 in compatibility mode	4
		Character Arrangement Tables, 3800-1 and 3800-3	4
SYS1.FONT38PP		3800 Page-Mode Fonts	
SYS1.FONT3820		3820 Page-Mode Fonts	
SYS1.MACLIB		System Macro Definitions	19
SYS1.PARMLIB	AP2XPARM	Global SVP Startup Parameters	5
	AP2XPSRV	TCP/IP Port Server Startup Parameters	24
	COMMNDxx	Global SVP Subsystem Startup Command	6, 21
	LNKLSTxx	Load Module Library Name	7, 21
	IEAAPFxx	Load Module Library Name	8, 21
	VATLSTxx	Identification of Volumes Required for APL2 Libraries	22, 21
	IEASYSxx	System Parameters	23, 21
SYS1.CMDLIB	APL2 and/ APL2AE	Executor Load Modules	9
SYS1.LOGON	APL2PROC	Logon procedure for APL2 Users	10
SYS1.HELP	APL2, AP2HELP	APL2 Invocation Help Data	
SYS1.RACFPRI		Data Set Definitions	11
SYS1.RACFSEC			
PASSWORD		Non-VSAM Data Set Passwords	12
Catalogs		Catalog Entries	13
userid.APL2INST.JCL		APL2 Sample Installation Jobs	14
APL2.AAP2SAMP		Distribution Library for APL2 Installation Jobs	15, 26
APL2.AAP2MODS		Distribution Library for Modules	15, 26
APL2.AAP2MACS		Distribution Library for Macros	15, 26
APL2.SAP2DBRM		Target Library for DB2 DBRM	15, 26
APL2.AAP2WKSP		Distribution Library for Workspaces	15, 26, 30
APL2.SAP2WKSP		Target Library for Workspaces	16, 26, 30
APL2.AAP2SRCL		Distribution Library for Source Code (options and user exits)	15, 26
APL2.SAP2SRCL		Target Library for Source Code	16, 26
APL2.AAP2NICK		Distribution Library for External Routine Nick-name Files	15, 26
APL2.SAP2NICK		Target Library for External Routine Nickname Files	16, 26

Figure 2 (Page 4 of 4). APL2 Installation Data Sets

Data Set Name	Member Name	Description	Notes
APL2.AAP2LANG		Distribution Library for National Language Message Translations	15, 26
APL2.SAP2LANG		Target Library for National Language Message Translations	16, 26
APL2.AAP2HELP		Distribution Library for National Language Help Text Translations	15, 26
APL2.SAP2HELP		Target Library for National Language Help Text Translations	16, 26
APL2.AAP2PROF		Distribution Library for Profiles	15, 26
APL2.SAP2PROF		Target Library for Profiles	16, 26
APL2.AAP2SYMB		Distribution Library for Symbol Sets	15, 26, 30
APL2.SAP2SYMB		Target Library for Symbol Sets	16, 26, 28, 30
APL2.AAP2FNTL		Distribution Library for Line-Mode Fonts (3800-1)	15, 26
APL2.SAP2FNTL		Target Library for Line-Mode Fonts	16, 26
APL2.SAP2FNTP		Distribution for Page-Mode Fonts (3800 APA)	15, 26
APL2.SAP2FNT2		Distribution for Page-Mode Fonts (3820)	15, 26
APL2.SAP2FNTP		Target Library for 3800 APA Fonts	16, 26
APL2.SAP2FNT2		Target Library for 3820 Fonts	16, 26
APL2.SAP2GSVP		Target Library for Global SVP	16, 26, 27
APL2.SAP2LMDS		Target Library for APL2 Load Modules	16, 26
APL2.SAP2SYSH		Target Library for APL2 Help Data	16, 26
APL2 SMP Data Sets			18
AP2V2R02.DEFAULT.VSAPLPR		Default Session Manager Profile	20
DB2 Sample Program Library	DSNTIAD	DB2 Sample Program	17

Notes to Figure 2:

1. This load module can be made LPA-resident, in which case all users of APL2 use the LPA copy of the module. The result is optimal performance; however, modules marked “1b” increase the common area requirement and decrease the available private area for all users. Modules marked “1a” should be placed in extended LPA when installed in MVS/XA systems. In systems that do not support 31-bit addressing, placing them in LPA has the same effect as “1b” modules. If this load module is not LPA-resident, the module is loaded into each APL2 user's private area, reducing the space available for the workspace.
2. This load module is needed only if the global SVP is to be used. It must reside in an authorized library and that library should be protected, because this module runs in supervisor state.
3. If the global SVP is not used, this part does not apply.
4. If the 3800-1 line-mode fonts are not used, you do not have to install these elements into SYS1.IMAGELIB.

5. IBM recommends that you place the global SVP parameters into SYS1.PARMLIB if this subsystem is used. AP2XPARM is the member name in the sample installation job data set; another name can be used in SYS1.PARMLIB.
6. If you are not using the global SVP, this element is not affected.
7. If the executor and auxiliary processors load module (APL2) are not LPA-resident or installed into SYS1.CMDLIB, the target library in which it is installed can be made into a command library by adding its name to the list in this member.
8. If the target library used for the global SVP load modules is not an authorized library, the target library used can be made into an authorized library by adding its name to the list in this member.
9. This module can be found by the system in a command library by installing it into SYS1.CMDLIB.
10. An installation can, optionally, create and install a logon procedure specifically for APL2 users; otherwise, this data set is not used.
11. If RACF* is in use, the RACF primary and secondary data sets have entries added according to the security and integrity system implemented by the installation.
12. If RACF is not in use, this data set may have entries added according to the security and integrity system implemented by the installation.
13. Master catalogs and, possibly, user catalogs, have entries for user catalogs, volumes, aliases, private libraries, project libraries, and public libraries. The types of entries depend upon:
    - The catalog structure
    - The catalog access permitted
    - The types of libraries used (SAM or VSAM)
14. This data set contains the sample installation jobs distributed with APL2 to help you with the installation of the product.
15. A distribution library is created during the SMP ACCEPT step.
16. A target library is created during the SMP APPLY step.
17. This data set is used as a source (read only) for a DB2 sample program executed when APL2 is bound to DB2. If DB2 is not installed or AP 127 is not to be used, this data set is not used. See the sample installation jobs “AP2JBND3” on page 125 and “AP2JBNDR” on page 127.
18. The installer controls which SMP data sets are used in the installation. The sample installation job provided allocates a full set of SMP/E data sets for APL2. See the sample installation job “AP2JBSME” on page 91. For APL2 Application Environment installation, see “AP2JESME” on page 113.
19. This data set is used as a source (read only).
20. See the sample installation job “AP2JPROF” on page 105.
21. See *OS/VS2 MVS System Programming Library: Initialization and Tuning*.
22. You only have to modify this member if the auxiliary storage of the installation has to be extended to accommodate APL2 or user auxiliary storage requirements.

23. The parameters most likely affected by the APL2 installation are APF, CMD, CSA, LNK, and VAL.
24. If the TCP/IP processor or cross-system shared variables are not used, you do not have to add this procedure to SYS1.PROCLIB.
25. This load module is required only in certain installations migrating from VS APL.
26. See the sample installation job “AP2JBALC” on page 87. For APL2 Application Environment installation, see “AP2JEALC” on page 110.
27. If the default target library for global SVP modules (SYS1.LINKLIB) is not used, the target library that is used must be an authorized library. See *OS/VS2 System Programming Library: Supervisor*.
28. GDDM requires that symbol set libraries have a block size that is a multiple of 400.
29. This module is intended for execution under AMODE (24) only.
30. Not included with APL2 Application Environment.

Planning for SMP

IBM provides sample jobs for installation of APL2 into an SMP/Extended (SMP/E) environment. In this environment, you have to decide whether to install APL2 into newly-allocated SMP libraries or into existing SMP libraries.

Planning the APL2 Libraries

The APL2 libraries consist of workspace libraries and file libraries.

Note: There are no workspace libraries for APL2 Application Environment.

The workspace libraries are:

- Public workspace libraries, which contain workspaces accessible to all APL2 users, including the workspaces distributed with APL2
- Project workspace libraries, which contain workspaces accessible only to a particular group of APL2 users
- Private workspace libraries, which contain workspaces accessible only to an individual APL2 user.

The file libraries are:

- Public file libraries, which contain APL data files accessible to all APL2 users
- Project file libraries, which contain APL data files accessible only to a particular group of APL2 users
- Private file libraries that contain the session manager log file, the `)COPY` work files, and APL data files accessible only to an individual APL2 user.

The workspace libraries can be:

- Sequential data sets under the control of the Sequential Access Method (SAM). The sequential data sets that comprise a workspace library are created as the workspaces are saved.
- Clusters under the control of the Virtual Storage Access Method (VSAM). The cluster that constitutes a workspace library must be defined and allocated before workspaces can be saved in it.
- A combination of sequential data sets and clusters. For example, the public workspace libraries could be VSAM libraries and the project and private workspace libraries could be SAM libraries, or the private workspace libraries for APL2 programmers could be SAM libraries and the private workspace libraries for end users could be VSAM libraries.

The file libraries must be VSAM clusters. The cluster that constitutes a file library must be defined and allocated before it can be used. You must define a file library for an APL2 user if that user:

- Requires a saved session manager log file.
- Creates private APL data files.
- Does not allocate the CPYSPILL and CPYSWAP data sets in their invocation CLIST. If these data sets are not available, a file library must be used.

SAM Workspace Libraries

Note: This does not apply to APL2 Application Environment.

In using SAM:

- APL2 allocates the sequential data sets required to save workspaces in the public, project, and private workspace libraries.
- Each workspace is stored as an individual sequential data set.
- The space available for all libraries is limited to the available space on the volume specified for workspace storage in the system option LIBSER, on the volumes included in an esoteric volume class named in LIBUNIT (see Appendix D, “APL2 System Options and Invocation Options” on page 148 for these two keywords), or on the volumes designated as storage volumes in the SYS1.PARMLIB member VATLSTxx.

  You can relieve a “library full” condition by deleting workspaces (data sets) from the volumes specified in the system option or designated as storage volumes in SYS1.PARMLIB member VATLSTxx, or by adding volumes designated for storage in the SYS1.PARMLIB member VATLSTxx or the esoteric class named as LIBUNIT.
- Hierarchical Storage Management (HSM) archives data at the workspace level. Under SAM, each workspace is a separate data set. Therefore, HSM can automatically migrate individual workspaces that have not been used within a period of time specified by the installation.

- RACF protects your data at the workspace level. Under SAM, RACF protection can be provided at the workspace level because each workspace is a separate data set.
- SAM protects your data at the workspace level. If RACF is not used, you can establish passwords using the PROTECT command to protect individual workspaces within a public, project, or private library.
- Each project library requires a special catalog entry in addition to the entries for each workspace. This entry has no associated data set or volume, but must not be deleted. APL2 creates the project library entry automatically, but the owner of the project library must have authority to add catalog entries with a high-level qualifier matching LIBQLFR.
- SAM uses a rigid three-level data set naming scheme unless an installation-written exit routine replaces it. For more information about this naming scheme, see "SAM Data Set Naming Convention."
- SAM requires a system-wide scheme of unique library numbers for public and project libraries.

You may want to use SAM if:

- You use HSM and you want workspace-level archiving by HSM.
- You want workspace-level RACF authorization.
- Your users frequently access large workspaces (over 500K bytes) or frequently save workspaces in project libraries. There are performance advantages to using SAM in these cases.

SAM Data Set Naming Convention

Note: This does not apply to APL2 Application Environment.

Figure 3. Data Set Name Formats for Workspaces in SAM Libraries

Library Type	High-Level Qualifier	Middle-Level Qualifier**	Low-Level Qualifier
Private	*user's profile prefix*	V	*wsname*
Project	*owner's profile prefix*	V*nnnnnnn*	*wsname*
Public	AP2V2R02 *	V*nnnnnnn*	*wsname*

* Assuming the default value for the system option PUBQLFR
** Assuming the default value for the system option APLID

The following convention applies to workspace names under SAM:

- SAM uses a rigid three-level data set naming scheme unless an installation-written exit routine replaces it. All names have three segments, referred to as high-level, middle-level, and low-level qualifiers. The low-level qualifier in all cases is the workspace name as known to APL2.

- For private workspaces, the high-level qualifier is the user's PROFILE PREFIX. The middle-level qualifier is the value of the system option APLID (see Appendix D, “APL2 System Options and Invocation Options” on page 148); its default value is the letter V.
- For public workspaces, the high-level qualifier is the value of the system option PUBQLFR (see Appendix D, “APL2 System Options and Invocation Options” on page 148); its default value is AP2V2R02. The middle-level qualifier is the value of the system option APLID followed by a library number.
- For project workspaces, the high-level qualifier is the owner's PROFILE PREFIX. The middle-level qualifier is the value of the system option APLID followed by a library number.

If the value of the system option APLID is a one-character string, library numbers of seven digits are possible; if the value of APLID consists of more than one character, correspondingly fewer digits in the library number are possible.

Examples of the data set naming syntax for the three types of libraries include:

Private A346770.V.MYWS
Project Q478976.V0001227.CALCRT
Public AP2V2R02.V0000093.PRCTG

For each project library, APL2 creates an additional catalog entry that identifies the owner of the workspace number. The first time a user creates a project workspace of a given number, the library pointer entry is created, identifying the PROFILE PREFIX that owns the library. The format of the library pointer entry is *LIBQFLR.Vnnnnnnn.prefix* and points to a volume with blanks as the volume serial. The default setting for LIBQFLR is APL2.

Note: Because of the peculiar nature of the library pointer entry, installations may need to take special precautions to avoid its being deleted (by catalog-cleaning programs, for example).

The library pointer entry allows APL2 to construct the true library name, which has the form *prefix.Vnnnnnnn.wsname*, and allocate that data set.

Library Ownership

Note: This does not apply to APL2 Application Environment.

Each APL2 user (or user group sharing a PREFIX) owns a private library. A user's private library is created automatically when that user first saves a workspace using the APL2 system command)*CONTINUE* or)*SAVE* for library 1001.

Only the owner of a private workspace library can save workspaces in, or delete workspaces from, that library. Library ownership is determined by PROFILE PREFIX rather than by user ID.

A project library is owned by the APL2 user (or PROFILE PREFIX group) who saves the first workspace in the library. The library is created automatically when an APL2 user first saves a workspace using the APL2 system command)*SAVE* for that library. If you have set the system option LIBKEEP to drop library ownership when all the workspaces in a project library have been deleted, be sure to notify your APL2 users.

All users can save workspaces in, or delete workspaces from, project libraries unless prevented by resource control mechanisms such as RACF. Library ownership for project libraries is also determined by PROFILE PREFIX rather than by user ID.

Public libraries are owned by the system under the high-level qualifier AP2V2R02 (see the system option PUBQLFR in Appendix D, “APL2 System Options and Invocation Options” on page 148). The library is created automatically when an authorized APL2 user first saves a workspace using the APL2 system command)*SAVE* for that library.

VSAM Libraries

In using VSAM:

- You must define a VSAM cluster for each library. This cluster contains all workspaces saved in that library.
- The space available in each library is controlled by the space parameter used in the Access Method Services DEFINE command.
- Each workspace in a VSAM library consists of one or more records in the cluster. The name specified when the workspace is saved is the root of the key for the record(s).
- To extend a full library, use the following procedure:
  1. Define a larger cluster for the library, using the Access Method Services DEFINE command.
  2. Copy the old library to the new cluster, using the Access Method Services REPRO command.
  3. Delete the old library using the Access Method Services DELETE command.
  4. Rename the new library to the name of the old library using the Access Method Services ALTER command or, alternately, edit CLISTs, PROCs, jobs, and so forth, to change all references to the old library into references to the new library.
- HSM archives data at the library level. Under VSAM, all workspaces having a common library number are stored in a single VSAM cluster. HSM is aware only of the last date that cluster was accessed and cannot automatically migrate individual workspaces that have not been used recently.
- RACF protects your data at the library level. Under VSAM, new workspaces are allocated out of an existing cluster and automatically assume any PROTECT, ADDSD, ALTDSD, and PERMIT attributes previously associated with the library. However, RACF protection can be provided only at the library level, with all the workspaces in a single library having the same RACF authorization.
- VSAM protects your data at the library level. If RACF is not used, VSAM passwords can be used to protect the clusters that define the public, project, and private libraries.
- There are no restrictions regarding the naming of the VSAM clusters that define the public, project, and private libraries.

- You must allocate a DDNAME, through JCL or the TSO ALLOCATE command, for each VSAM library to be accessed. APL processes any libraries not covered by such a DDNAME as SAM libraries.
- Unique library numbers for the public, project, and private libraries are not required. In fact, multiple users can reference distinct libraries with the same number by allocating the common library number to different clusters. Unique authorization identifiers are required for the global SVP, if used.

You may want to use VSAM if:

- Your installation data set naming convention conflicts with the convention provided for the use of SAM libraries.
- You do not use the hierarchical storage manager (HSM), or you determine that library-level archiving by HSM is acceptable.
- You are migrating from APLSV, VS APL under CICS*, or VSPC. VSAM works very much like the library control in those systems and provides the same kind of control over user space.
- You want library-level RACF authorization.
- You are creating a public library that is rarely updated and contains small, frequently accessed workspaces. There are performance advantages to using VSAM in this case.

SAM/VSAM Comparison

Note: This does not apply to APL2 Application Environment.

Figure 4 provides a comparison of workspace library characteristics using SAM and VSAM.

Figure 4 (Page 1 of 2). VSAM and SAM Characteristics

Characteristics	VSAM	SAM
Number of Data Sets	One per library	One per workspace
Hierarchical Storage Manager (HSM) Migration Level	Library	Workspace
Resource Access Control Facility (RACF) Support Level	Library	Workspace
Password Protection Level	Library	Workspace
Data Set Naming	No restrictions	See “SAM Data Set Naming Convention” on page 12.
Library Numbers	Defined on individual or project basis	Defined for entire system. Each library has a unique number.
User Space Quota	Established by Access Method Services DEFINE for each library	No limit by user; all users limited to space available on storage volumes or volumes specified by system options LIBSER and LIBUNIT.

Figure 4 (Page 2 of 2). VSAM and SAM Characteristics

Characteristics	VSAM	SAM
Data Set Creation	Access Method Services DEFINE needed to create libraries	Data sets created automatically
Performance	Best performance for small workspaces in public libraries	Best performance for large workspaces

Library Numbering

Numbers are used to distinguish:

- Users (in user-to-user communication through the global SVP): The ID number identifying a user of the global SVP is normally as specified or defaulted at APL2 invocation, although your SVP installation exit may override it.
- Libraries (public, project, and private): Traditionally, the numbers 1 through 999 are used to identify public libraries, and the numbers 1000 through 9999999 are used to identify project libraries. This can be changed by using the PBLIBMX installation option.

  Each user can have as many as two private libraries:

  – If the number 1001 has not been allocated to a VSAM library, it is a private SAM library.

  – The ID number is a private VSAM library if it has been allocated as such.

During the planning phase, develop a numbering scheme for public libraries, auxiliary processors, and users. In doing so, note that:

- The numbers 1 and 2 are the defaults used for the public libraries built from the workspaces distributed with APL2.
- APL2 uses the number 1001 as the SAM private library number and also the default user number (that is, the default value for the ID invocation option).
- APL ID numbers interact with library numbers, because the ID is used as a default library number.

Determining the Default APL2 System Options to Change

APL2 system options are parameters that can modify aspects of APL2 to the individual requirements of its user community. The APL2 system options allow you to:

- Control attributes and name qualifiers for SAM workspaces. (This does not apply to APL2 Application Environment.)
- Specify the default and overriding invocation options.
- Change the default National Language Translation and time zone for system commands and messages.
- Identify auxiliary processors to be permanently linked with APL2.
- Specify a global shared variable subsystem ID.
- Provide values to be returned by the AP 100 APL USERS command.

To identify any system options that you may need to change, review the default system options summarized in Appendix D, "APL2 System Options and Invocation Options" on page 148. To identify the appropriate values for any options to be changed during installation, you should consult the APL2 users or the APL2 administrator.

You can change the default system options by applying a USERMOD during APL2 installation or any time after installation.

If you have modified the VS APL system options in a VS APL installation, you might want to modify the system options in the APL2 installation in a similar way.

Determining the APL2PI Command Options to Change

The APL2PI command options are parameters that tailor the invocation of APL2 to the individual requirements of the APL2PI user community. The APL2PI command options allow you to:

- Specify the name of the APL2 or APL2 Application Environment module that should be used when invoking APL2 from APL2PI.
- Specify the invocation options that should be used by APL2PI.

The default APL2 invocation module name used in the APL2PI options module, AP2XAPIC, refers to the default name for the full APL2 product invocation module. If this name has been changed, or if the APL2 Application Environment is to be used, the name in AP2XAPIC command options module should be changed.

To identify the appropriate values for any invocation options to be changed during installation, you should consult the APL2PI users or the APL2 administrator.

You can change the default APL2PI command or options by applying a USERMOD during APL2 installation or any time after installation.

Planning for Installation Exit Routines

APL2 supports two types of installation exit routines:

- A set of problem-state exits that gain control at user invocation of APL2, during system command processing, and at exit from APL2. These exits permit installation control of who uses APL2, what TSO and APL2 commands can be used from APL2, and what workspaces you can access. They also allow usage accounting, local extensions to the set of APL2 commands, and more sophisticated invocation option handling schemes.
- A supervisor-state exit from the global Shared Variable Processor (SVP) that controls access to cross-memory services by APL2 users. This exit can reject user invocation of APL2, permit invocation but disable cross-memory usage, and validate or replace the APL ID number used for the session.

APL2 provides a sample module named AP2TIUSR for the problem-state exits. You may replace or modify that module to fit your own needs. However it, or its replacement, must be linked with APL2 for the system to operate correctly. A listing of this sample module is shown in Appendix F, "Installation Exit Routine" on page 155.

No sample is provided for the global SVP exit, but its interfaces are defined in “Establishing the APL2 Installation Exit for the Global SVP” on page 75. The global SVP operates correctly without the exit, but system security may be compromised. The exit is not needed or used if you choose not to install the global SVP.

Determining APL2 Storage Requirements

Estimates for virtual and auxiliary storage under TSO are listed in Figure 5 on page 18.

- The two center columns refer to the separation of storage in MVS/XA and MVS/ESA systems between “24-bit addressable” (below 16M) and “31-bit addressable” (above 16M) storage areas.
- If the APL2 product is not installed in the MVS link pack area (LPA) then the **Total** shown is required in each user's private TSO region.

Figure 5. APL2 Storage Requirements under TSO

	MVS/XA and MVS/ESA		**MVS/370**
	Below 16M	**Above 16M**	
Private	0.3M	0.6M - 1000M	0.9M - 8M
LPA	0.3M	0.8M - 2M	1M - 2M
Total	0.6M	2M - 1000M	2M - 10M

Notes:

1. “M” is one megabyte, or 1048576 bytes.
2. All numbers are approximations with only one significant digit. That is why, for example, 1000M and 2M “total” only 1000M.
3. The numbers shown as 1000M can, in theory, be up to nearly 1008M, but in practice installations usually want to impose considerably smaller limits because of system resource constraints.
4. The wide ranges in the **Private** (and hence also **Total**) rows are primarily due to variations in the user's active workspace size. They assume a minimum 512K byte workspace size, though some APL applications can run in even smaller workspaces.
5. The variation in LPA usage depends on whether the entire product or only a subset of it has been installed there. If part of the product is rarely used, that part can be loaded into private storage instead of LPA. If only the APL2 Application Environment is installed, the LPA usage may be even smaller than shown.
6. In addition to the space shown, use of the optional Global Shared Variable Processor (GSVP) adds a requirement to the MVS Common Storage Area (CSA or extended CSA) for at least 60K, and perhaps considerably more, depending on the SMSIZE specified when starting the GSVP.

For both MVS/SP Release 1 and Release 2, a CSA requirement exists only if global SVP is installed and used. The computation of the CSA requirement is described under “Planning for Installation of the Global SVP” on page 21.

Auxiliary storage requirements for APL2 are estimated in Figure 6 and Figure 7 on page 20.

Figure 6. Auxiliary Storage Requirements for APL2

Data Set Names	Block Size	Blocks	Members	Directory Blocks
SYS1.LINKLIB	6144	1200	39	10
SYS1.PROCLIB	3120	7	3	1
SYS1.IMAGELIB	1024	1180	82	12
SYS1.PARMLIB	3120	4	1	1
SYS1.CMDLIB	6144	120	1	1
SYS1.LOGON	3120	6	1	1
SYS1.HELP	3120	9	1	1
userid.APL2INST.JCL	6160	75	26	5
APL2.AAP2SAMP	6160	65	33	5
APL2.AAP2MODS	6144	750	304	75
APL2.AAP2MACS	6160	150	55	5
APL2.AAP2WKSP	6160	400	52	5
APL2.SAP2WKSP	6160	400	52	5
APL2.AAP2SRCL	6160	40	5	1
APL2.SAP2SRCL	6160	40	5	1
APL2.AAP2NICK	6160	25	92	10
APL2.SAP2NICK	6160	25	92	10
APL2.AAP2LANG	6160	70	32	5
APL2.SAP2LANG	6160	70	32	5
APL2.AAP2HELP	6160	600	8	5
APL2.SAP2HELP	6160	600	8	5
APL2.AAP2PROF	7250	10	2	5
APL2.SAP2PROF	7250	5	2	5
APL2.AAP2SYMB	6160	60	19	5
APL2.SAP2SYMB	400	750	19	5
APL2.AAP2FNTL	6160	2500	30	5
APL2.SAP2FNTL	6160	2500	30	5
APL2.AAP2FNTP	8209	85	50	5
APL2.AAP2FNT2	8209	65	50	5
APL2.SAP2FNTP	8209	85	50	5
APL2.SAP2FNT2	8209	65	50	5
APL2.SAP2GSVP	6144	20	5	5
APL2.SAP2LMDS	6144	1200	34	10
APL2.SAP2SYSH	6160	5	1	1
AP2V2R02.DEFAULT.VSAPLPR	4096	1	1	1

Figure 7. Auxiliary Storage Requirements for APL2 Application Environment

Data Set Names	Block Size	Blocks	Members	Directory Blocks
SYS1.LINKLIB	6144	800	32	10
SYS1.PROCLIB	3120	7	3	1
SYS1.IMAGELIB	1024	1180	82	12
SYS1.PARMLIB	3120	4	1	1
SYS1.CMDLIB	6144	120	1	1
SYS1.LOGON	3120	6	1	1
SYS1.HELP	3120	9	1	1
userid.APL2INST.JCL	6160	75	20	5
APL2.AAP2SAMP	6160	65	33	5
APL2.AAP2MODS	6144	750	264	75
APL2.AAP2MACS	6160	150	18	5
APL2.AAP2SRCL	6160	40	4	1
APL2.SAP2SRCL	6160	40	4	1
APL2.AAP2NICK	6160	25	78	10
APL2.SAP2NICK	6160	25	78	10
APL2.AAP2LANG	6160	70	32	5
APL2.SAP2LANG	6160	70	32	5
APL2.AAP2HELP	6160	600	8	5
APL2.SAP2HELP	6160	600	8	5
APL2.AAP2PROF	7250	10	1	5
APL2.SAP2PROF	7250	5	1	5
APL2.AAP2FNTL	6160	2500	30	5
APL2.SAP2FNTL	6160	2500	30	5
APL2.AAP2FNTP	8209	85	50	5
APL2.AAP2FNT2	8209	65	50	5
APL2.SAP2FNTP	8209	85	50	5
APL2.SAP2FNT2	8209	65	50	5
APL2.SAP2GSVP	6144	20	5	5
APL2.SAP2LMDS	6144	800	27	10
APL2.SAP2SYSH	6160	5	1	1

For estimates for SMP data sets, consult *APL2 Program Directory*.

Planning for Migration from VS APL

Note: Migrating workspaces does not apply to APL2 Application Environment. If you are migrating directly from VS APL to APL2 Application Environment, you must obtain versions of your application that have already been packaged, or at least already migrated to APL2 Version 2 Release 2.

VS APL users must migrate VS APL workspaces to APL2. The APL2 system command)*MCOPY* simplifies this procedure, but additional modification of workspaces may be required. VS APL data files may also require migration. Workspaces and files must be migrated individually. For directions on migrating VS APL workspaces and files, see *APL2 Migration Guide*.

The APL2 versions of the auxiliary processors that IBM supplies must be used with APL2. The VS APL auxiliary processors of the same name and similar function may not be used. VS APL user-written auxiliary processors must be migrated by the user. Migration can be made easier if similar customization is done in installing APL2 as was done in installing VS APL. Chapter 5, “Customizing APL2” on page 67, discusses customization in detail.

Planning for Data Security

To protect the integrity of APL2 workspaces, files, and libraries, security procedures are required. APL2 provides no facilities for protecting your data. It is your responsibility to provide your own data protection, using such security features as:

- TSO PROTECT command, for password protection of non-VSAM data sets
- Access Method Services (AMS), for password protection of VSAM data sets
- RACF, or a similar facility, for general data access control

APL2 library system commands and auxiliary processor commands have provisions for supplying passwords. If users attempt to access password-protected data sets without supplying any password, the access method may prompt for a password.

Determining Postinstallation Customization Requirements

During installation, you may have to customize APL2 to meet the requirements of the users. In the planning phase, you should consult your APL2 users to determine the specific areas that have to be customized. See Chapter 5, “Customizing APL2” on page 67.

Planning for Installation of the Global SVP

The global Shared Variable Processor (SVP) is an optional APL2 facility, which runs as an MVS subsystem. With the global SVP installed and operative, authorized APL2 users can share variables with other authorized and concurrently active APL2 users or with global auxiliary processors. Installation and activation of the global SVP result in the following behavior:

- Specific offers from authorized APL2 users are first made to auxiliary processors locally (in the same address space). If no appropriate auxiliary processor is signed on locally, the offer is extended to other authorized APL2 users in other address spaces.
- General offers from authorized APL2 users are never extended locally. They are always extended to other authorized APL2 users (or global auxiliary processors) in other address spaces.

For use of the global SVP, authorization is provided through an installation-written exit routine (see “Establishing the APL2 Installation Exit for the Global SVP” on page 75).

The minimum CSA (or extended CSA under MVS/XA) requirement for use of the global SVP can be computed as follows:

- 32K (for global SVP code and work areas)
- 40 times the value of the MAXPROC startup parameter, and the values of the SMSIZE and TRACETBL startup parameters (see Appendix B, “Startup Parameters for Global SVP” on page 133)
- The size of the installation-written exit routine code (see “Establishing the APL2 Installation Exit for the Global SVP” on page 75)

This size permits arrays of up to 25K bytes to be transferred. Since APL2 supports transfers of arrays up to 16 megabytes (under MVS/XA), much larger requirements may apply, depending on local usage.

Planning for Installation of the APL2 Port Server

APL2's cross-system shared variable facility provides communication across TCP/IP networks through APL2 shared variables. The APL2 port server is an integral part of the cross-system shared variable support.

The APL2 port server is an optional APL2 facility that runs as a separate APL2 session normally as a started task. Either the APL2 or APL2 Application Environment product can be used to run the server. Although it is possible for users to use cross-system shared variables without a port server, the port server makes the initialization of share variable connections less cumbersome.

In order for the APL2 port server to operate, TCP/IP must be installed.

By default, the APL2 port server uses TCP/IP port number 31415. If this port number is unavailable on the system, the port server should be started using a different port number. If a port number other than the default is used, you may elect to modify the default APNAMES invocation option value.

Unlike variables shared using the global shared variable processor, cross-system variables are stored in the users' local shared memory. If users require the ability to transfer larger objects than fit in the default shared memory size, you may elect to increase the default SHRSIZE invocation option value to provide larger shared memories.

Planning for Start/Stop Terminals under NCP Control

The use of start/stop terminals with APL keyboards under Network Control Program (NCP) control require customization of the NCP. The translation table COR2 must be used for terminals using correspondence transmission code. The translation table BCD2 must be used for terminals using BCD transmission code.

For information about specifying the translation table to be used, see the manual describing the NCP macros appropriate to the installed level of NCP. For information concerning the translation tables themselves, see the data areas handbook appropriate to the installed level of NCP.

Planning for APL2 Invocation with Other Products

If you plan to run APL2 with Graphical Data Display Manager (GDDM) or DB2, then GDDM or DB2 should be installed before APL2 is installed.

If you plan to invoke APL2 under ISPF and you plan to install the APL2 command processor load module in the link pack area, then you should ensure that the name of the APL2 command processor load module appears in the ISPF command module (ISPTCM). If necessary, you should plan to modify the ISPF module to include the name of APL2. Details regarding this modification are provided in the installation manual for the installed level of ISPF.

Note: In making this modification, a flag setting of X'02', for example, indicates that APL2 is a module in the link pack area (LPA).

For instructions on using APL2 under ISPF with AP 317, see *Interactive System Productivity Facility Dialog Management Guide and Reference* manual appropriate for your operating system.

ISPF provides translate tables, ISPAPLTT and ISRAPLTT, which support the newer APL2 characters. To prepare for ISPF's support of these characters, the translate tables must be assembled, link-edited, and placed in ISPF's search order. Once the translate tables are available, two methods can be used to enable ISPF's use of them:

1. Modify panels ISPOPT1, ISPOPT3A, and ISPOPT3B. You can either add a new terminal type selection or modify an existing one. In either case, you should have a terminal type selection that translates to module name ISPAPLTT.

   Note: The translate table name must be ISPAPLTT, not ISRAPLTT.

   Go to PDF option 0.1 and select the terminal type you have added or modified.

2. Either from a panel, an exec/clist/program, an APL2 function, or under ISPF dialog test, issue the following ISPF service request:

   ```
   ISPEXEC SELECT PGM(ISPTTDEF) PARM(ISPAPLTT)
   ```

   This causes ISPF to select the APL2 translate tables and enable APL2 character support.

   Note: This technique can be used under program control to enable and disable ISPF's APL2 character set support. However, PDF option 0.1's output does not reflect that any change has been made. To change translate tables again, either use ISPTTDEF again with a different translate table name or change your terminal type in PDF option 0.1. (Simply entering 0.1 does not suffice, you must change the type.) Use of ISPTTDEF causes a permanent change that persists across invocations of ISPF until ISPTTDEF or PDF option 0.1 is used again.

For further instructions on using ISPF's translate table support consult *ISPF and ISPF/PDF Planning and Customization*.

Preinstallation Checklist

1. Check *APL2 Program Directory* for updates to the information on installation activity, check procedures in this book, and check the RETAIN/370 Preventive Service Planning (PSP) Facility for a list of prerequisite PTFs.
2. Meet the software and hardware requirements for running APL2.
3. Determine the jobs you want to use to allocate data sets for the APL2 Licensed Program. If you do not want to use the default data sets specified in the job, identify the data sets you use. Determine what types of data sets you need for the installation of APL2.
4. Decide whether to install APL2 into newly-allocated SMP libraries or into existing ones.
5. Develop a numbering scheme for public libraries, auxiliary processors, and users.
6. Determine which default APL2 system options to change. Change them by applying a USERMOD either during APL2 installation or any time after installation.
7. Plan for installation exit routines.
8. Determine APL2 storage requirements, depending on the host system level and whether APL2 is executed from the link pack area, extended storage, or the private area of the user's address space.
9. Plan for migration from VS APL.
10. Provide data security by choosing your own data protection, such as the TSO PROTECT command, Access Method Services (AMS), or RACF (or a similar facility).
11. Determine the specific areas of APL2 that you may have to customize in order to meet the requirements of the users.
12. Prepare for the installation of the global SVP by ensuring that the CSA requirements for use of the global SVP are satisfied. Write the installation exit routine for the global SVP. See “Establishing the APL2 Installation Exit for the Global SVP” on page 75 for more information.
13. Plan for start/stop terminals under NCP control by customizing the NCP and specifying the translation table to be used.
14. Arrange for APL2 invocation with other products. GDDM, ISPF, or DB2 should be installed before APL2 is installed.

Planning for GDDM

The APL2 session manager assumes GDDM is installed with EBCDIC code page 351 as the default code page. If your installation has customized GDDM so that some other code page is the default, then APL characters may not be handled properly. To correct this, reset the default with a GDDM external defaults file. GDDM external defaults files are described in detail in *GDDM Base Programming Reference Volume 2*, SC33-0332.

Under TSO, you do this by creating a sequential data set with RECFM(F) and LRECL(80). Any data set name can be used, but the data set must be allocated as

a specific FILENAME before APL2 is invoked. By default, GDDM expects the data set to be allocated as FILENAME(ADMDEFS), but this name can be customized at your installation.

The file or data set should contain the following record:

```
 ADMMDFT APPCPG=351
```

Note that the leading blank is required before ADMMDFT.

Chapter 3. Installing APL2

This chapter contains a summary of the installation procedure as well as step-by-step instructions. Your installation plan contains information that helps you install APL2.

Installation Summary

The System Modification Program (SMP) handles APL2 installation. SMP/E Release 6 or higher is required. IBM provides sample installation jobs on the distribution tape for APL2. In addition to the sample installation jobs the distribution tape contains the object modules, macros, workspaces, symbol sets, and the 3800 fonts distributed with APL2.

From SMP's perspective, the installation consists of the RECEIVE, APPLY, and ACCEPT steps, but supplemental steps are necessary to complete the installation. The APL2 installation steps are listed below.

1. Prepare the host system
2. Copy the sample jobs from the distribution tape
3. Install the APL2 SMP procedure
4. Define a VSAM user catalog, a high-level qualifier, or both (optional)
5. Allocate the SMP data sets (optional)
6. Allocate the APL2 data sets
7. Allocate VSAM clusters (optional)
8. RECEIVE the APL2 Licensed Program
9. Change the default APL2 system options and installation exits (optional)
10. Change the default APL2 API command options (optional)
11. APPLY the APL2 Licensed Program
12. BIND APL2 to DB2 (optional)
13. Define APL2 to TSO as a new command processor (optional)
14. Define the APL fonts for the IBM 3800 printer (optional)
15. Generate the VS APL options module (optional)
16. Prepare the APL2 Invocation CLIST
17. Install the APL2 workspaces
18. Create the APL2 session manager profile (optional)
19. Verify that APL2 is installed correctly
20. Define the global SVP as an MVS subsystem (optional)
21. Install the APL2 port server (optional)
22. ACCEPT the APL2 Licensed Program
23. Perform postinstallation procedures (optional).

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Step-By-Step Installation Instructions

Detailed instructions for performing each installation step are provided below.

If the progress messages indicate that APL2 has not been installed correctly, check your job output to verify successful completion of each installation step. If each installation step seems to have completed successfully, but it is still not working, contact your IBM Branch Office or Systems Engineer for assistance.

Step 1–Prepare the Host System

1. Log on to a TSO user ID to be used for this installation. If you have to define a user ID, it must have the following attributes:
   - The ability to update the master catalog. This is necessary to define user catalogs, ALIASes, SPACE, CLUSTERs, etc.
   - The ability to update system data sets. You must know the necessary passwords or have RACF PERMIT authorization.
   - The ability to issue RACF commands or the TSO PROTECT command, as appropriate. This is necessary to provide for the security and integrity of the installed product.
   - The ability to submit batch work.
   - The authority to BIND plans and packages, and the ability to access the DB2 sample library, if the APL2 interface to DB2 is enabled.
   - A MAXSIZE value in the UADS data set of at least 2048K bytes.
2. Ensure that the required space is available in the system data sets affected by this installation (see Figure 6 on page 18). If the required space is not available, you have to allocate it.
3. If you are going to install the global SVP, you may need to allocate additional CSA space (for more information, see "Planning for Installation of the Global SVP" on page 21). If necessary, increase the CSA allocation in the IEASYSxx member of the SYS1.PARMLIB data set.

Step 2–Copy the Sample Jobs from the Distribution Tape

The APL2 distribution tape provides two sets of sample jobs. You must select the appropriate jobs depending on whether you are installing the full APL2 product or the APL2 Application Environment.

To obtain the appropriate jobs from the tape, create and execute a job similar to AP2JBTAE for the full product or AP2JETAE for the application environment. For more information, see Appendix A, "Sample JCL Statements" on page 86.

Note in general that jobs specific to APL2 and APL2 Application Environment have names beginning with AP2JB and AP2JE, respectively.

Execution of the appropriate job listed above creates a partitioned data set consisting of members named for the jobs contained in them. A description of each member (or job) appears in Figure 8. Printouts of these sample jobs appear in the appendixes to this manual.

Figure 8. APL2 Sample Jobs

Application Environment Member	APL2 Member	Function
AP2PSMPE	AP2PSMPE	SMP procedure for APL2 installation
AP2JDEFN	AP2JDEFN	Defines a VSAM user catalog and the high-level data set name qualifier
AP2JESME	AP2JBSME	Allocates SMP data sets
AP2JEALC	AP2JBALC	Allocates APL2 target and distribution libraries
AP2JEVSM	AP2JBVSM	Allocates VSAM clusters for APL2 libraries
AP2JEREE	AP2JBREE	RECEIVEs the APL2 Licensed Program
AP2JUSRE	AP2JUSRE	RECEIVEs a USERMOD to the APL2 Licensed Program for system options modification and installation exit modification
AP2JEAPE	AP2JBAPE	APPLYs the APL2 Licensed Program to the designated target libraries, incorporating any USERMODs
Not applicable	AP2JPROF	Loads the session manager default profile
Not applicable	AP2JBTCH	Creates public libraries
AP2BND3 AP2BNDR	AP2BND3 AP2BNDR	Performs the BIND and GRANT steps for AP 127
AP2JFONT	AP2JFONT	Loads the APL2 fonts into IMAGELIB
AP2CLSTE	AP2CLSTV/AP2CLSTS	Invocation CLISTs
AP2JEACE	AP2JBACE	ACCEPTS the APL2 Licensed Program into the APL2 distribution libraries as permanent backup
Not applicable	AP2JUOPT	Link-edits the VS APL options module
AP2PSVP	AP2PSVP	Global SVP startup procedure
AP2XPSRV	AP2XPSRV	TCP/IP port server startup parameters
AP2XPARM	AP2XPARM	Global SVP startup parameters
Not applicable	AP2JUSAP	Link-edits a user-written auxiliary processor
AP2PSRV	AP2PSRV	TCP/IP port server startup procedure

After you obtain the sample jobs, you must modify each of the jobs used for the remaining installation steps to include the appropriate job and accounting information, unit information, modified data set names, and so forth. A directory of the modifications required to each of the jobs appears as comments at the end of each job.

More detail on how to use each of these jobs is provided below under the appropriate installation step.

Step 3–Install the APL2 SMP Procedure

A sample SMP procedure for installing APL2 is provided for you in member AP2PSMPE. Edit the procedure appropriately. You should install the procedure in the SYS1.PROCLIB data set for use by the other sample jobs provided, or embed the procedure in the sample jobs that reference it.

Step 4–Define a VSAM User Catalog, High-Level Qualifier, or Both (Optional)

The AP2JDEFN job defines a VSAM user catalog and the high-level qualifier(s) for use in the installation of APL2. You can skip this step if:

- You are using the master catalog
- You are using an existing user catalog and the high-level qualifier required has already been defined for that user catalog

If you define the high-level qualifier for an existing user catalog, you can eliminate the DEFINE USERCATALOG statement.

High-level qualifiers are required for the following purposes:

- The SMP, target, and distribution libraries allocated and referenced in the sample jobs provided for APL2 installation are all specified with the high-level qualifier `'APL2'`. Entries with this prefix are cataloged only during installation, customization, and maintenance. For more information, see Appendix A, “Sample JCL Statements” on page 86. This qualifier can be changed by editing the jobs, and for target libraries, editing any affected CLISTs and LOGON procedures.
- The value of the system option `'PUBQLFR'` specifies the high-level qualifier for the default APL2 session manager profile and for public workspace data sets in a SAM library environment. Normally only system administrators need to catalog data sets with this prefix. The default value for this system option is `'AP2V2R02'`. For more information on system options, see Appendix D, “APL2 System Options and Invocation Options” on page 148.

  Note: This does not apply to APL2 Application Environment.
- The value of the system option `'LIBQLFR'` specifies the high-level qualifier for project library ownership entries in a SAM library environment. Users who create new project libraries need to be able to create entries with this prefix. The default value for this system option is `'APL2'`. For more information on system options, see Appendix D, “APL2 System Options and Invocation Options” on page 148.

  Note: This does not apply to APL2 Application Environment.

If you do not change the sample jobs or the PUBQLFR and LIBQLFR system options, the high-level qualifiers 'APL2' and 'AP2V2R02' have to be defined. If you do change any or all of these items, the values used in place of 'APL2' and 'AP2V2R02' have to be defined.

Note: The 'AP2V2R02' qualifier does not apply to APL2 Application Environment.

Edit the AP2JDEFN job appropriately, then execute the job.

Step 5–Allocate the SMP Data Sets (Optional)

The SMP data sets for this installation are allocated in the AP2JBSME job (or AP2JESME for APL2 Application Environment). The space required for installation of APL2 is shown in *APL2 Program Directory*.

The job contains allocations for the data sets in blocks on a generic DASD device. The allocations provided are more than sufficient for the requirements shown in *APL2 Program Directory*.

Edit the AP2JBSME job (or AP2JESME for APL2 Application Environment) appropriately, then execute the job.

Step 6–Allocate the APL2 Data Sets

The APL2 product data sets, including both target and distribution libraries, required for this installation are allocated in the AP2JBALC job (or AP2JEALC for APL2 Application Environment). The space required by the data sets is shown in Figure 6 on page 18.

The job contains allocations for the data sets in blocks on a generic DASD device. The allocations provided are more than sufficient for the requirements shown in Figure 6 on page 18.

The system data sets SYS1.LINKLIB, SYS1.HELP, SYS1.FONT38PP, and SYS1.FONT3820 are the default target libraries for the APL2 load modules, system help data, and APA fonts, respectively. If you choose not to install into the default target libraries, allocations for APL2 product data sets as substitute target libraries are provided as comments.

Additionally, if you choose not to install the APL2 load modules into SYS1.LINKLIB, and you want to install the global SVP load modules into a separate library, because of the requirement that the global SVP reside in an authorized library, an allocation for an APL2 product data set as an alternate target library has been provided as comments.

Edit the AP2JBALC (or AP2JEALC) job appropriately, and then execute the job.

Step 7–Allocate VSAM Clusters (Optional)

The AP2JBVSM job (or AP2JEVSM for APL2 Application Environment) provides samples for the allocation of VSAM clusters for APL2 workspace (APL2 only) and file libraries. (See “Planning the APL2 Libraries” on page 10 for information on deciding what VSAM clusters you need.) You can modify this job to perform only the allocations required for this installation or you can extend this job to include the

allocations for all APL2 libraries, to allow for the use of user catalogs, and similar allocations.

Edit the AP2JBVSM (or AP2JEVSM) job appropriately, and then execute the job.

Step 8–RECEIVE the APL2 Licensed Program

The AP2JBREE job (or AP2JEREE for APL2 Application Environment) performs the SMP RECEIVE of the APL2 Licensed Program into temporary data sets. Edit the job appropriately, and then execute the job.

You can expect a return code of 00 from RECEIVE processing.

Step 9–Change the Default APL2 System Options and Installation Exits (Optional)

IBM distributes APL2 with a system options module that contains all the default values shown in Appendix D, "APL2 System Options and Invocation Options" on page 148. It also contains a set of default and override invocation options, and a set of values to return in response to the AP 100 "APL USER" built-in command. The entire source for the system options module is shown in Appendix C, "AP2TIOPT/AP2TIOPX/AP2XAPIC Option Modules Source Listing" on page 135. If the default values shown are adequate for your installation, you can skip this step.

If your installation plan requires changing the default APL2 system options, make the changes according to the procedure outlined under "Changing AP2TIOPT/AP2TIOPX System Options" on page 68. The APL2 system options and their default values are summarized in Appendix D, "APL2 System Options and Invocation Options" on page 148.

IBM also distributes a sample installation exit module with the APL2 product. You may provide code there to control invocation and AP 100 processing, modify the way APL2 handles any system commands, or even to implement additional local commands. The entire source is shown in Appendix F, "Installation Exit Routine" on page 155.

You can modify the system options or installation exits during installation or, by repeating SMP APPLY and ACCEPT procedures, at any time after installation.

In order to modify the default modules during the initial installation, you need to:

1. Build an SMP user modification (USERMOD).
2. Perform the SMP RECEIVE of the USERMOD.
3. Include the USERMOD or USERMODs in the SMP APPLY of the product.

The reassembly of the AP2TIOPT/AP2TIOPX or AP2TIUSR module occurs during the SMP APPLY of the USERMOD. See "Step 11–APPLY the APL2 Licensed Program" on page 32.

The AP2JUSRE job provides a skeleton into which the user modifications can be inserted, and that creates and RECEIVEs a USERMOD. This job can be modified and repeated for each USERMOD.

The AP2TIUSR sample provided with APL2 requires Assembler H Version 2 (5668-962) or the High Level Assembler (5696-234). If your installation does not use either assembler by default, you can add the ASM option to the SET command

in this job to specify the alternate assembler for this USERMOD. (The AP2TIOPT, AP2TIOPX, and AP2XAPIC modules do not require Assembler H.)

For details regarding the building and processing of the USERMOD, and the use of the SET command to modify the OPTIONS entry, see *SMP/E Reference*, SC28-1107.

Step 10–Change the Default APL2 API Command Options (Optional)

IBM distributes APL2 with an options module, AP2XAPIC, that defines what invocation command options are used when APL2 is invoked through APL2PI. The entire source for the API command options module is shown in Appendix C, "AP2TIOPT/AP2TIOPX/AP2XAPIC Option Modules Source Listing" on page 135. If the default values shown are adequate for your installation, you can skip this step.

Note: The default AP2XAPIC specifies that the command `APL2` should be used to invoke APL2. If APL2AE is to be used through APL2PI, the default command name needs to be changed.

You can modify the APL2PI invocation options during installation or, by repeating the SMP APPLY and ACCEPT procedures, at any time after installation. In order to modify the default module during the initial installation, you need to:

1. Build an SMP user modification (USERMOD).
2. Perform the SMP RECEIVE of the USERMOD.
3. Include the USERMOD or USERMODs in the SMP APPLY of the product.

The reassembly of the AP2XAPIC module occurs during the SMP APPLY of the USERMOD. See "Step 11–APPLY the APL2 Licensed Program."

Step 11–APPLY the APL2 Licensed Program

The AP2JBAPE job (or AP2JEAPE for APL2 Application Environment) performs the SMP APPLY of APL2 into the target libraries. You need to:

1. Edit the job appropriately. Modify the APPLY statement, if an optional USERMOD was received in the previous installation step, by deleting the `'/*'` preceding the `'XXXXXXXX'`. Then replace `'XXXXXXXX'` with the unique identifier of the USERMOD to be applied with the product.
2. Execute the job. This execution, with the CHECK operand on the APPLY statement, checks for possible errors before actually updating the target libraries and SMP data sets.
3. Examine the output from the APPLY CHECK processing. Correct any errors and repeat the APPLY CHECK step.
4. When no errors are detected in APPLY CHECK processing, modify the APPLY statement by removing the CHECK operand.
5. Execute the job.

During SMP APPLY CHECK processing, you receive the following SMP message:

*GIM*43401W MODULE AP2TAPV1 IN SYSMOD=HLO1222 — WAS NOT INSTALLED IN ANY TARGET LIBRARY

You can ignore this message.

You can expect a return code of 04 from APPLY CHECK processing.

During SMP APPLY processing, you receive the following SMP message:

*GIM*43401W MODULE AP2TAPV1 IN SYSMOD=HLO1222 — WAS NOT INSTALLED IN ANY TARGET LIBRARY

You can ignore this message.

In installations where the MVS/370 DFP or MVS/XA DFP licensed program (5665-295 and 5665-284, respectively) have not been installed, the following linkage editor messages are issued during SMP APPLY processing:

IEW0302 *MODE statement*

IEW0302 ERROR – INVALID STATEMENT – – SCAN TERMINATED

You can ignore these messages.

You can expect a return code of 04 from APPLY processing.

Step 12–BIND APL2 to DB2 (Optional)

If the DB2 Licensed Program is installed and you want to use AP 127 (the SQL auxiliary processor), you need to perform this step.

There are two jobs for registering AP 127 as a DB2 program.

The AP2JBND3 job is for registering AP 127 on your local system.

In addition, if you want to use AP 127 to access remote databases, the AP2JBNDR job can be used to register AP 127 on remote systems.

Note: APL2 does not have to be installed on the remote system in order to access the databases on that system. If it is installed on the remote system, however, the AP2JBNDR job may not need to be run. AP2JBNDR must be run if:

- APL2 is not installed on the remote system
- The remote system is not TSO (that is, VM or OS/400*)

The bind jobs:

- Create plans and packages in DB2 for AP 127. They use a database request module (DBRM) supplied with APL2.

  There are two sets of plans and packages created, one with isolation level CS (cursor stability) and the other with isolation level RR (repeatable read). Both are necessary for correct operation of AP 127.

- Grant APL2 users RUN authority for the plans and packages.

In the AP2JBND3 job, the GRANT statements are run using the DB2 sample program DSNTIAD. If necessary, you can create the sample program by executing the job DSNTIJSG from the DB2 sample library, and binding the sample program created to DB2. The sample program must have been previously bound in order for it to properly execute in this step.

As an alternative to using the GRANT statements in the sample job, you can issue the GRANTs interactively from SPUFY or from within APL2, as long as you are running from the same user ID that did the BIND.

When BINDing to a remote location, you must issue the GRANT statements from the remote location. You can do this using either SPUFY or APL2 on the remote system.

DB2 must be up when the BIND jobs are run.

For details regarding the BIND, RUN, and GRANT statements, see *IBM Database 2 Command and Utility Reference*.

Due to requirements for consistency when running on remote databases, it is not recommended that you change the plan names in the BIND jobs. If you do change them, however, the nondefault names must be specified in the APNAMES parameter when APL2 is invoked:

```
APNAMES(AP2X127(CSPLAN(planname) RRPLAN(planname))
```

The APNAMES parameter can also be used to specify the subsystem name for DB2, and to specify the starting isolation level:

```
APNAMES(AP2X127(SSID(id) ISOL(level))
```

You can set defaults for all of these APNAMES parameters to AP 127 by modifying the APL2 options module. See Chapter 5, “Customizing APL2” on page 67 for details.

Step 13–Define APL2 to TSO as a New Command Processor (Optional)

A library other than SYS1.LINKLIB can be used for the APL2 load modules to restrict access to APL2 to a limited group of users. If you specify a target library other than SYS1.LINKLIB (the default) for the APL2 load modules during SMP APPLY processing, you can define APL2 as a new command processor in one of three ways:

- Copy the executor and auxiliary processors load module, APL2, from the target library into SYS1.CMDLIB.
- Transform the target library into a command library by concatenating it to the SYS1.CMDLIB data set, through an update to the LNKLSTxx member of the SYS1.PARMLIB data set.
- Specify the target library on the STEPLIB DD statement, or a concatenation of it, in the LOGON procedure used by APL2 users.
- Concatenate the target library to ddname ISPLLIB to enable use of APL2 while ISPF is active.

You can then invoke APL2 like any other TSO command processor.

Step 14—Define APL Fonts for IBM 38xx Family Printers (Optional)

All Points Addressable (APA) fonts are provided with the product for 3800 model 3 (38PP type) and 3820 class devices (including 3812 and 3827). These fonts are installed by SMP into the appropriate font libraries. If you maintain a font index you may wish to rerun your PSF index generation job after APL2 installation.

If you have an IBM 3800 Model 1 printer at your installation and you want to define the 3800 model 1 (line mode) fonts to your system, you should perform the remainder of this step.

The AP2JFONT job invokes the IEBIMAGE utility program to store the APL2 fonts into SYS1.IMAGELIB. Edit the job appropriately, and then execute the job.

For information on how to use the IEBIMAGE utility to define the 3800 fonts, see *IBM 3800 Printing Subsystem Programmer's Guide* or *IBM 3800 Printing Subsystem Model 3 Programmer's Guide: Compatibility*.

Step 15–Generate the VS APL Options Module (Optional)

Note: This step does not apply to APL2 Application Environment.

If you have not previously used VS APL, or if you have previously used VS APL and you used the default values for the system options APLID, PUBQLFR, and LIBQLFR, you can skip this step.

If you have previously used VS APL and you modified the values of any or all of the system options APLID, PUBQLFR, and LIBQLFR, then the system options module, APLYUOPT, from VS APL have to be made available to APL2 in order for APL2 to locate the referenced workspace when an APL2 user issues the system command)*MCOPY* to migrate a VS APL workspace.

The sample job AP2JUOPT performs the link-edit of the VS APL options module APLYUOPT. Before you can successfully run AP2JUOPT, you must assemble APLYUOPT. If you do not place the resulting text deck in the data set VSAPL.APLMODS, you must modify AP2JUOPT accordingly. Edit the job appropriately, then execute the job.

Step 16–Prepare the APL2 Invocation CLIST

APL2 is invoked in subsequent steps of this installation procedure. Those invocations should be made using the updated invocation CLIST.

If an invocation CLIST is used to provide users access to APL2:

- Members AP2CLSTS and AP2CLSTV contain sample CLISTs for the invocation of APL2. Member AP2CLSTE contains a sample CLIST for the invocation of APL2 Application Environment. These CLISTs are shown in Appendix G, “Sample Invocation CLISTs” on page 185.
- Edit the applicable CLIST(s) according to the comments in them, allocating the appropriate libraries for your installation and specifying the appropriate APL2 invocation parameters.
- Copy the updated CLIST(s) to the CLIST data set that is available to all APL2 users.

Step 17–Install the APL2 Workspaces

Note: This step does not apply to APL2 Application Environment.

To load the workspaces distributed with APL2 into the public libraries, do the following:

1. Edit the AP2JBTCH job, as necessary, to:
   a. Assign appropriate library numbers in the)*WSID* statements.
   b. Supply passwords in the)*WSID* statements.
   c. Alter the target library name in the)*IN* statements.

d. If using VSAM, add allocations for the VSAM libraries.

2. Execute the AP2JBTCH job.

Step 18–Create the Default APL2 Session Manager Profile (Optional)

Note: This step does not apply to APL2 Application Environment.

The AP2JPROF job creates the session manager default profile.

The data set name of the file created by this job must have a high-level qualifier that is the same as the high-level qualifier of public libraries (see the system option PUBQLFR in Appendix D, “APL2 System Options and Invocation Options” on page 148). If you have changed the public library qualifier in changing the default APL2 system options, the same qualifier must be placed in the PUBQLFR parameter of the S1 EXEC statement.

Edit the job appropriately, and then execute the job.

Step 19–Verify That APL2 Is Installed Correctly

To verify that APL2 has been installed successfully, invoke the installed product with the RUN(TSOIVP) parameter as follows:

```
ALLOC FI(APLPRINT) DA(*) REUS
name  RUN(TSOIVP) TERM(-1)
```

where *name* is the name of the CLIST created in Step 16, or the command installed in LPA or SYS1.CMDLIB in Step 13.

Note: The following allocations are also required for this step:

```
ALLOC FI(APL2HELP) SHR REUSE DA('APL2.SAP2HELP')
ALLOC FI(APL2LANG) SHR REUSE DA('APL2.SAP2LANG')
ALLOC FI(AP2TN011) SHR REUSE DA('APL2.SAP2NICK')
```

If these allocations are not present in the invocation CLIST or LOGON procedure, they have to be entered by hand before invoking APL2.

Appendix I, “Sample IVP Execution Log” on page 192, contains two sample logs from the execution of the installation verification program (IVP), one for APL2 and one for APL2 Application Environment.

Step 20–Define the Global SVP as an MVS Subsystem (Optional)

If you want to make the APL2 global SVP available to all users upon invocation of APL2, you should perform this step.

The load modules that make up the APL2 global SVP were created during the APPLY step.

1. Edit the procedure AP2PSVP appropriately. Follow the comments appended to the procedure.
2. Edit member AP2XPARM appropriately. Follow the comments appended to the file.
3. Install the procedure AP2PSVP in data set SYS1.PROCLIB, with a member name of APL2SVP.

4. Optionally, install member AP2XPARM in data set SYS1.PARMLIB, with the member name specified in the SVPPARMS DD statement in the procedure AP2PSVP.
5. Write the installation exit routine for the global SVP. See “Establishing the APL2 Installation Exit for the Global SVP” on page 75.
6. After the installation exits have been installed, verify the functioning of the global SVP with the assistance of an APL administrator, as follows:
   a. Start the global SVP manually from the operator's console by entering the command:

      ```
      START APL2SVP
      ```

   b. Initiate an APL2 session and reexecute the installation verification program. To verify the presence of the global SVP, you should invoke APL2 using the ID( ) parameter. If the ID parameter is not used, the IVP always indicates:

      ```
      SHARED MEMORY:  LOCAL
      ```

      If you are installing APL2 Application Environment, invoke APL2 by entering:

      ```
      ALLOC F(APLIN) DA(*)
      ALLOC F(APLPRINT) DA(*)
      APL2AE ID(...)
      ```

      Use this same procedure for the second invocation in step 6c below.
   c. Initiate two APL2 sessions that, in performing user-to-user communication, verify the functions of the installation exits. To do this:
      - Select a second ID number that the SVP exit should accept as authorized. (These two numbers are referred to as *id1* and *id2*.)
      - At the *id1* session (started in step 6b) enter:

        ```
        id2 ⎕SVO 'CHKG'
        ```

        The system should return a `1`.
      - Initiate a second APL2 session, specifying *id2*. In this session, enter:

        ```
        id1 ⎕SVO 'CHKG'
        ```

        The system should return a `2`.
      - Now enter the following line in the second session:

        ```
        CHKG←'OK'
        ```

      - Return to the first session and enter:

        ```
        CHKG
        ```

        The system should respond with `OK`.
   d. Terminate both APL2 sessions by entering:

      ```
      )OFF
      ```

   e. If the verification fails, shut down the global SVP manually from the operator's console by entering the command:

      ```
      STOP APL2SVP
      ```

7. Add the following command to member COMMNDxx of data set SYS1.PARMLIB:

   ```
   COM='START APL2SVP'
   ```

   On any subsequent system IPL, the global SVP is started and initializes itself as an MVS subsystem.

Step 21—Install the APL2 Port Server (optional)

If you want all users to be able to use cross-system shared variables (variables shared across TCP/IP networks), you should perform this step.

1. Edit the invocation parameter file AP2XPSRV appropriately. Follow the instructions in the file. Be sure to provide a password or else you will not be able to shut down the port server except by issuing a console FORCE command. A printout of AP2XPSRV is provided in Appendix K, “TCP/IP Samples” on page 198.

   If a port number other than the default, 31415, is used, be sure to notify the users of the fact.

   If the name of the APL2 module was changed, also modify this file so that it uses the correct name.

2. Install the file AP2XPSRV in data set SYS1.PARMLIB with a member name of AP2XPSRV.

3. Edit the started task's JCL procedure AP2PSRV if necessary. Follow the instructions in the file. A printout of AP2PSRV is provided in Appendix K, “TCP/IP Samples” on page 198.

   If data set names other than the installation defaults were used for the language and NAMES files, modify the JCL appropriately.

   If the APL2 module was not placed in the LPA, uncomment the STEPLIB ddname and ensure it specifies the correct data set name.

4. Install the procedure AP2PSRV in data set SYS1.PROCLIB with a member name of AP2PSRV.

5. Verify the functioning of the port server:

   a. Start the port server manually from the operator's console by entering the command:

      ```
      START AP2PSRV
      ```

   b. Verify, by use of the TSO STATUS command that the started task is executing.

   c. Initiate an APL2 session, that by issuing a port server command, verifies the port server is operating correctly. Invoke APL2 using the invocation option DEBUG(1) to cause secondary messages to be automatically displayed. If a port number other than the default, 31415, was used in the AP2XPSRV file, also use the invocation option APNAMES(AP2X119 SERVPORT(*portnumb*)) when invoking APL2. *portnumb* must be the port number you specified in AP2XPSRV.

      During this process, if APL2 is not able to contact the port server, AP 119 should issue one or more messages describing the problem. If APL2 does not return the correct response or an an error occurs, exit APL2 by entering:)*OFF*

- Once in APL2, enter:

```
119 ⎕SVO 'C119'
```

  The system should return a `1`.

- Enter:

```
1 ⎕SVC 'C119'
```

  The system should return `1 1 1 1`.

- Again enter:

```
119 ⎕SVO 'C119'
```

  The system should return a `2`. If it does not, wait a few moments and try again.

- Enter:

```
C119←'AP' 'PSSHUTD' 'password'
C119
```

  Where:

  password is the port server password you specified in AP2XPSRV.

  The system should return `0 0 0`

- Exit APL2 by entering:

```
)OFF
```

d. Use the TSO STATUS command again to determine if the port server has shut down.

   If it has not shut down, shut down the server manually from the operator's console by entering the command:

```
FORCE AP2PSRV
```

If the port server correctly shut down in response to the *PSSHUTD* command, you have verified it operates correctly.

If the port server did not correctly shut down in response to the *PSSHUTD* command, you should examine the APL2 session log produced by the started task in the APLPRINT ddname or try running the port server from an interactive APL2 session rather than in batch. Starting the port server interactively is discussed in “Running the Port Server” on page 80.

6. Add the following command to member COMMANDxx of data set SYS1.PARMLIB:

```
COM='START AP2PSRV'
```

   On any subsequent IPL, the port server is started. You can also restart it manually by reissuing the START command yourself.

Step 22–ACCEPT the APL2 Licensed Program

The AP2JBACE job (or AP2JEACE for APL2 Application Environment) performs the SMP ACCEPT of APL2 into the distribution libraries.

When the APL2 installation verification procedure has run successfully and you have run successful tests, proceed as follows:

1. Edit the job appropriately. Modify the ACCEPT statement if an optional USERMOD was received and applied in prior installation steps by deleting the '/*' preceding the 'XXXXXXXX'. Replace 'XXXXXXXX' with the unique identifier of the USERMOD to be accepted with the product and by deleting the '/*' preceding the USERMOD's operand.
2. Execute the job. This execution, with the CHECK operand on the ACCEPT statement, checks for possible errors before actually updating the distribution libraries and SMP data sets.
3. Examine the output from the ACCEPT CHECK processing. Correct any errors, and repeat the ACCEPT CHECK step.
4. When no errors are detected in ACCEPT CHECK processing, modify the ACCEPT statement by removing the CHECK operand.
5. Execute the job.

   During SMP ACCEPT processing, you can receive the following SMP message when a USERMOD is ACCEPTed:

   *GIM*2471 BLDL FAILED IN LIBRARY *name* FOR LOAD MODULE *name* IN SYSMOD *name*

   You can ignore this message.

   You can expect a return code of 00 from ACCEPT processing if you have not applied USERMODs, or 04 if you have applied them.

Step 23–Perform Postinstallation Procedures (Optional)

1. In some environments, you may have to customize the distributed workspace PRINTWS. Refer to ABSTRACT, DESCRIBE, and HOW in the PRINTWS workspace for descriptions of the options available and the customizing that is required. (This does not apply to APL2 Application Environment.)
2. If you are using GDDM and have, therefore, installed the APL2 symbol sets:
   - Add a DD statement to the GDDM print utility procedure, ADMPRINT, concatenating the APL2.SYMBLIB data sets to the ADMSYMBL DD statement. For more information on:
     - Symbol sets, see the *Graphical Data Display Manager (GDDM) Base Programming Reference*
     - The ADMPRINT procedure, see the *Graphical Data Display Manager (GDDM) Installation and System Management*

       Note: This does not apply to APL2 Application Environment.
3. If you are invoking APL2 under ISPF and have installed the APL2 command processor load module in the link pack area, modify the ISPF command module (ISPTCM). For details, refer to the installation manual for the installed level of ISPF.

Postinstallation Maintenance

After you install and verify APL2, apply any program temporary fixes (PTFs) necessary to bring APL2 to its current level. IBM recommends that you reverify it after you apply maintenance. For more information on applying product maintenance, see “Maintaining APL2” on page 84.

Chapter 4. APL2 Invocation and Termination

APL2 is invoked from the host system environment by a command. The default command name is APL2, but your installation may have changed the name of the command. Whatever its name, you can do one of the following:

- Manually enter it after the host system is initialized.
- Execute a CLIST that invokes the APL2 command.
- Have the command automatically invoked when you log on to TSO. This is normally done through CLIST.CLIST(DEFAULT) member.

The)*OFF* or)*CONTINUE* system command terminates your APL2 session and allows either you or the invoking CLIST to continue with your TSO session.

Appendix D, “APL2 System Options and Invocation Options” on page 148 contains a summary of invocation options.

Appendix G, “Sample Invocation CLISTs” on page 185 contains TSO CLIST examples.

For a more detailed description of the underlying system during invocation and termination, see *O/S VS2 TSO Terminal User's Guide*.

Starting APL2—The APL2 Command

You can invoke APL2 with the following command:

For APL2

APL2 *option1, option2, ..., option*

For APL2 Application Environment

APL2AE *option1, option2, ..., option*

where:

option is one of the keyword parameters used to tailor the APL2 environment for a particular APL2 session.

Before invoking APL2, you should have:

- A 2-megabyte region, at least.

  You may need more if you are using large applications.

- Allocated files to be used by APL2.

  These files are normally allocated by a CLIST that invokes the product.

A complete list of ddnames recognized by APL2 under TSO can be found in Appendix E, “APL2 Files and Data Sets” on page 153.

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Continuing with the Invocation Options

Invocation options entered through keyword parameters to the APL2 command are available to tailor the APL2 environment for a particular APL2 session. The invocation options are summarized alphabetically by keyword in Figure 9 on page 44 and described in detail in "Description of Invocation Options" on page 45. To find out quickly what the option keywords are, enter the following: `HELP APL2`

Each keyword option is usually followed by a value in parentheses. Default values are supplied for the options, and these are generally satisfactory for beginning APL2 users. You may, however, want to override some of the options to customize the APL2 session to meet your needs. To override one or more options, enter the APL2 command followed by the keyword and value of the option(s) you want to override. For example, you enter the following command to invoke APL2 when the APL2 session manager is to be suppressed: `APL2 SMAPL(OFF)`

Keyword options can be specified in any order after the APL2 command, and the keywords can be abbreviated. The abbreviation must be at least the first two characters of the keyword.

If the same keyword appears more than once in the APL2 command, the value of the last one entered is used. For example, the following APL2 command initiates an APL2 session without the session manager: `APL2 SMAPL(ON) ID(1007) SMAPL(OFF)`

The DEBUG, SYSDEBUG, and TRACE options can be specified as positive or negative integers. The system treats them as binary flags and turns the corresponding flags on if the integer is positive or turns them off if the integer is negative. For example:

`DEBUG(7)`	A value of 7 is treated as binary 1 1 1 and specifies setting `DEBUG (4 2 1)` on.
`DEBUG(-5)`	A value of `-5` is treated as binary -(1 0 1) and specifies setting `DEBUG(4 1)` off.

Successive specifications have the effect of successively turning the corresponding flags on and off. For example:

`DEBUG(6) DEBUG(-3)`	First, the 4 and 2 DEBUG flags are set; next, the 2 and 1 DEBUG flags are turned off. The result is a setting of `DEBUG(4)`.

The defaults supplied with APL2 are given with the detailed descriptions of the options in "Description of Invocation Options" on page 45. Your installation may have changed some or all of these defaults. Check with your system administrator to find out which of these options may have been changed during the installation of APL2 at your site.

Figure 9. Summary of APL2 Invocation Options

Keyword	Description
AISIZE(*size*)	Specifies the number of bytes of data that can be stacked by AP 101, the alternate input (stack) processor.
APNAMES(*name*[('*string*')]...)	Specifies the auxiliary processors to be used in addition to those automatically loaded.
CASE(*n*)	Identifies the alphabet to be used when APL2 accepts, returns, or displays the names of the APL objects.
CODE(*nnnnn*)	Same as TERMCODE option.
DATEFORM(ISO|ES|EU)	Specifies the format for time and date stamps.
DBCS(TRY|ON|OFF|*nnn*)	Indicates whether mixed APL2/DBCS is supported for I/O during the APL2 session.
DEBUG(*nnn*)	Alters normal error recovery actions of APL2 for debugging purposes.
DSOPEN(*device-token*)	Specifies a device-token to be passed to GDDM (if it is available) on a DSOPEN call.
EXCLUDE(*name...*)	Specifies the auxiliary processors you do not want loaded into your session.
FREESIZE(*size*)	Specifies a minimum limit on the amount of virtual storage not used for the active workspace or shared variables.
HILIGHT(*setting*)	Specifies whether input, output, or both are to be highlighted on the screen.
ID(*nnnnnnn*)	Specifies an identifier number to be associated with the current APL2 session.
INPUT('*string*'...)	Specifies one or more input lines to be given to APL2 upon invocation.
LOADLIB(*dsname ...*)	Specifies one or more private load libraries from which APL2 modules, auxiliary processors, or AP 100 commands can be loaded.
NLT(*language*)	Allows users to override the installation default for the national language in their invocation EXEC or CLIST, and allows the language to be set before APL2 is running.
PROFILE(*name*)	Identifies the name of the APL2 session manager profile to be loaded on invocation.
QUIET[(ON|OFF)]	Prevents APL2 from displaying output until it prompts for input.
RUN(['*locator*'] *function*)	Specifies name of a niladic function in a namespace as a part of entry to APL2.
SHRSIZE(*size*)	Specifies the amount of virtual storage to be reserved for the shared variable processor.
SMAPL(TRY|ON|OFF|*nnnn*)	Specifies whether or not the APL2 session manager is to be used during your APL2 session or whether the interpreter should share a variable with processor *nnnn*.
SVMAX(*nnnnn*)	Specifies the maximum number of shared variables that you can concurrently share.
SYSDEBUG(*nnn*)	Specifies special debugging settings for use by system programmers.
TERMCODE(*nnnnn*) *or* CODE(*nnnnn*)	Specifies controlled invocation
TRACE(*nnn*)	Provides special debugging aids for use by system programmers.
WSSIZE(*size*)	Specifies the amount of virtual storage in your TSO region to be reserved for your active workspace.
XA(*nn*)	Identifies whether working storage in an XA or ESA system should be allocated above or below the 16-megabyte address boundary.

Description of Invocation Options

This section lists the invocation options in alphabetic order by keyword. The headings show the syntax of the options; the descriptions explain how to use each option and what values to specify.

Four options allow you to specify an integer *size* value. These options are:

```
AISIZE(size)
FREESIZE(size)
SHRSIZE(size)
WSSIZE(size)
```

Unless otherwise restricted by the maximum value allowed for the option, *size* can be specified as bytes, kilobytes, or megabytes. To specify kilobytes or megabytes, follow *size* with a K or M, respectively. To specify a size in bytes, enter a number only. For example, all the following are valid values for the FREESIZE option:

```
FREESIZE(2048000)
FREESIZE(2000K)
FREESIZE(2M)
```

You may also express *size* as a percentage. For example, to reserve 50% of the virtual machine size for your workspace, you could specify:

```
WSSIZE(50%)
```

Your installation of APL2 may provide defaults for each of the invocation options. Your installation may also prevent you from changing some of these options by providing system overrides for them. Check with your system administrator to find out which, if any, options have system overrides.

AISIZE(*size*)

Specifies the maximum number of bytes of data that can be stacked by AP 101, the alternate input (stack) processor.

size
Integer, expressed in bytes or kilobytes. For example:

```
AISIZE(8192)
     or
AISIZE(8K)
```

Note: "M" and "%" are permitted, but are not normally useful.

Minimum size: 0
Maximum size: Limited by region size
IBM-supplied default: 512 bytes

Note: The number of lines that can be stacked by AP 101 depends on the length of each line and the stack size specified by this option. If you attempt to place more lines than can fit on the stack, the entire stack is cleared, as indicated by a nonzero return code on the stack request.

APNAMES(*name*[*('string')*]...)

The APNAMES option identifies auxiliary processors not automatically available but which you plan to use during your APL2 session. Processors named with this option can be those distributed with APL2 or those written by your system programming staff.

name
Name of the load module for the processor you want available. More than one name can be specified. For example:

```
APNAMES(USERAP1 USERAP2)
```

Your installation normally provides resident auxiliary processors that are automatically available to your session. If you specify a name in this option that is the same as the name of a resident processor, the resident version is ignored and a load module with the specified name is searched for and loaded. If you specify an auxiliary processor that uses the same number as the resident auxiliary processor, the specified auxiliary processor should have the same name as the resident, or you must use the exclude option to exclude the resident. For example:

```
APN(A0121) EXC(AP2X121)
```

Figure 10 on page 48 contains the names of the auxiliary processor load modules supplied with APL2.

Under TSO, the following are searched to locate the specified module name:

- Task libraries (including those specified in the LOADLIB invocation option—see the description of the LOADLIB option on page 56)
- Link pack area
- Link libraries

('*string*')
Optional character string of parameters to be passed to the auxiliary processor. For example:

```
APNAMES(USERAP1 USERAP2('EBCD') USERAP3('L'))
```

Most auxiliary processors distributed with APL2 ignore any character strings specified as parameters. The *string* parameter can be used with user-written auxiliary processors and with AP 119 and AP 127.

AP 119 Access: The following options can be specified with the APNAMES parameter:

SERVPORT(*nnn*)
Normally, the local port server is listening on port number 31415. If the port server is using a different port number, this parameter must be used to allow AP 119 to communicate with the server. Allowable values are 256 to 65535.

LISTEN(*nnn*)
AP 119 does not normally open a listening connection until a variable is offered to a remote processor. If you would like AP 119 to open a listening connection on startup, use this parameter. AP 119 attempts to use the number specified as its listening port. If this number is unavailable, the listening connection is not started. Allowable values are 256 to 65535, or 0 to let TCP/IP assign an arbitrary number.

TCPID(*ccc*)
AP 119 expects the name of the started task name to be TCPIP. If the name is different, this parameter must be used to allow AP 119 to successfully communicate with TCP/IP.

This is an example of using the startup parameters:

```
APL2 APNAMES(AP2X119(SERVPORT(1234) LISTEN(2345) TCPID(TCPTEST)))
```

If no options are specified using APNAMES, the default is:

```
SERVPORT(31415) TCPID('TCPIP')
```

AP 127 Access: You can use APNAMES to override some default values for AP 127:

```
APNAMES(AP2X127(RRPLAN(name) CSPLAN(name) SSID(sys) ISOL(level)))
```

name
Character string that identifies a DB2 application plan. The default values are **APL2V22R** (for RRPLAN) and **APL2V22C** (for CSPLAN).

sys
Character string that identifies the DB2 subsystem. The default is **DSN**.

level
Character string that specifies the starting isolation level. Must be RR or CS. The default is **RR**.

The auxiliary processor AP 127 needs to be specified on APL2 invocation only if you want to override one or more of these defaults. For any keyword not specified, the defaults from the installation options module is used.

Figure 10. Module Names of Auxiliary Processors Supplied with APL2

Auxiliary Processor	Module Name
AP 100	AP2T100
AP 101	AP2T101
AP 102	AP2T102
AP 111	AP2T111
AP 119	AP2X119
AP 120	AP2X120
AP 121	AP2X121
AP 123	AP2T123
AP 124	AP2X124
AP 126	AP2X126
AP 127	AP2X127
AP 210	AP2T210
AP 211	AP2X211

CASE(*n*)

Identifies the alphabet to be used when APL2 returns or displays the names of APL objects.

n One of the following:

0 Both lowercase and underbarred characters are valid and synonymous when evaluating names. Primitives that return names as results (⎕*NL*, ⎕*CR*, ⎕*FX*, ⎕*SVQ*, ⎕*TF*), and system commands and messages that produce names, produce them using the underbarred rather than the lowercase alphabet.

1 Both lowercase and underbarred characters are valid and synonymous when evaluating names. Primitives that return names as results, and system commands and messages that produce names, produce them using the lowercase rather than the underbarred alphabet.

2 In general, underbarred characters are not valid in names and are not accepted or produced in system functions, commands or messages. Underbarred letters in the arguments to)*COPY*,)*PCOPY*,)*MCOPY*, and)*IN* are accepted as lowercase letters to aid migration.

Note: The response to)*ERASE*, given underbarred letters, is the underbarred letters.

The default shipped by IBM is CASE(1). Your installation may change the default or specify an overriding value.

The CASE(*n*) invocation parameter does **not** apply to all work done by you during the APL2 session. Instead, it is interpreted as an implicit parameter of a)*CLEAR* command. CASE is, in fact, a workspace attribute in all workspaces. (Any workspaces created by APL2 release 1 have an attribute of 0; and the default for releases 2 and 3 was also 0.) The workspace attribute is saved with the workspace and is not changed when the workspace is loaded.

Objects can be copied into the active workspace using)*COPY*,)*PCOPY*,)*MCOPY* or)*IN* without affecting the workspace attribute. The names of copied objects, as well as names referred to by copied functions or defined operators, are converted appropriately.

Note: Literal strings and comments within functions, and the content of indirect copy lists, are **not** converted.

No matter what CASE setting or workspace attribute is in effect, shared variable names containing underbarred characters are never transferred from the APL2 interpreter to the SVP. The underbarred characters are instead translated to lowercase. Names returned to the interpreter from the SVP are handled and displayed in accordance with the workspace attribute.

CODE(*nnnnn*)

Used by APL2 to identify the type of terminal you are using. CODE is a synonym for TERMCODE. See the description of the TERMCODE invocation option on page 63.

DATEFORM(ISO|US|EU)

Specifies the format for date and time stamps displayed during operations, such as)*LOAD* and)*SAVE*.

ISO
International Standards Organization convention, which follows the format *yyyy-mm-dd hh.mm.ss*.

ISO is the IBM-supplied default.

US
United States preferred convention, which follows the format *mm/dd/yyyy hh.mm.ss*.

EU
European convention, which follows the format *dd.mm.yyyy hh.mm.ss*.

For example, to display the European format, you specify: `DATEFORM(EU)`

The date and time are formatted as: `27.03.1992 11.30.52 (`*GMT*`+1)`

Note: The APL2 date and time display is always followed by the user's time zone offset from Greenwich Mean Time (GMT).

DBCS(TRY|ON|OFF|*nnn*)

The DBCS invocation option is used to tell APL2 what double-byte character set (DBCS) data to display and input during the APL2 session. It also sets the default DBCS number for the DBCS translation option of various auxiliary processors and external functions.

Many languages have more characters than can fit in the APL2 atomic vector, $\square AV$. Japanese, Korean, and Chinese are examples. IBM has defined DBCS to represent these languages. These characters can be displayed on displays that support the DBCS, such as the IBM 5550 multistation. Each DBCS character occupies two columns on the screen. DBCS characters and characters from $\square AV$ may be mixed on the screen.

Note: APL2 supports the display of DBCS only through the session manager, AP 126, and $)EDITOR\ 2$. GDDM is required. For testing purposes, GDDM can provide limited, emulated DBCS support on displays that do not actually support DBCS.

APL2 also supports DBCS in APLIN and APLPRINT files.

When DBCS data is being processed, the DBCS invocation option can control the identification of the DBCS used. In particular, a user with a display that does not support real DBCS or with a display supporting one DBCS can simulate operation on a display with a different DBCS.

If the DBCS invocation option is not used, APL2 determines whether or not mixed APL2/DBCS data is to be displayed based on the presence of DBCS support as reported by GDDM. If GDDM reports that the display has a DBCS, or that GDDM emulated DBCS support is available, then APL2 allows mixed DBCS data. For displays that have real DBCS support, the DBCS id defaults to the CPGID of the DBCS display. For GDDM emulated DBCS support, the DBCS id defaults to 0.

DBCS(TRY) If GDDM indicates that the display has a DBCS, then activate DBCS support and use the CPGID as the DBCS identifier.

If GDDM indicates that emulated DBCS support is being used, then treat as DBCS(0).

If GDDM is not available, or it indicates that no DBCS support is available, then treat as DBCS(OFF).

Note: DBCS(TRY) is the default in the installation options module as distributed by IBM, but your installation may choose a different default.

DBCS(ON) Behaves like DBCS(TRY), except this ends the APL2 session if DBCS is not available rather than treating as DBCS(OFF).

DBCS(OFF)

- Substitute $'\omega'$ for any DBCS characters on terminal output.
- Do not accept DBCS on terminal input.
- Use 0 as the DBCS identifier when auxiliary processors and function routines convert DBCS data to APL data.
- Permit any DBCS identifier when auxiliary processors and function routines convert APL data to DBCS data.

DBCS(*nnn*) Use the decimal value *nnn* as the DBCS identifier and activate DBCS display support. The value of *nnn* must be between 0 and 32,767 inclusive.

Only APL data with the specified DBCS identifier can be converted to DBCS data by auxiliary processors, function routines, or terminal output processors.

Note: DBCS(0) is not equivalent to DBCS(OFF), even for auxiliary processors or function routines.

This invocation option may be changed during the APL2 session by either the *OPTION* external function or *)CHECK SYSTEM DBCS*. If this is done, APL2 display support is restarted. For the session manager, this means that any in-storage log file is discarded.

DEBUG(*nnn*)

Alters normal error recovery actions taken by APL2. It can assist in debugging errors.

Note: Your installation may supply one or more debug settings that you cannot override.

nnn

One or more numbers (positive or negative) of the debug settings you want to change. A positive number turns on one or more settings, whereas a negative number turns off one or more settings. Several settings can be turned on or turned off with a single number equal to the sum of the numbers for the individual settings. For example, to specify debug settings 2 and 4, specify either:

```
DEBUG (2 4)
```
or
```
DEBUG (6)
```

To turn off setting 4, specify:

```
DEBUG (-4)
```

IBM-supplied default value: 0

Your installation may provide a default DEBUG value other than 0.

The debug settings and their meanings are:

1—MSG Displays secondary error messages without prompting.

Note: Use of this setting produces messages for exceptional conditions that are not necessarily error conditions. For example, end of file may or may not be an error, depending on the situation. An error message is displayed immediately, before an attempt to determine if the condition is acceptable.

2—ECHO Causes all input to APL2 from the AP 101 input stack to be "echoed" (displayed) at your terminal. Normally, input from the AP 101 stack is not displayed at the terminal as it is executed.

4—XDUMP Default setting; provides more complete dumps. Typical dumps are about 50 pages long. Under this setting, they may be 200 to 500 pages or more, depending on the workspace size. For a further explanation of APL2 storage dumps, see *APL2/370 Diagnosis Guide*.

8—ESTIMATE Provides estimates of the progress of long-running library operations (`)LOAD`, `)COPY`, or `)SAVE`).

32—MSGID Provides the message identifier number, along with the text of any message produced by APL2. For example, the following message:

```
DOMAIN ERROR
```

displays with DEBUG(32) as:

```
AP2IAPL254 DOMAIN ERROR
```

64—NOLX Suppresses execution of `⎕LX`, the latent expression, when workspaces are loaded with the `)LOAD` command.

128—NOQUEMSG
Discards secondary messages rather than queuing them. While 1—MSG is turned on, secondary messages are immediately displayed rather than queued, so the setting of this flag is irrelevant.

DSOPEN(*device-token***)**

Specifies a value to be passed to the Graphical Data Display Manager (GDDM) as the device-token parameter on a GDDM DSOPEN call. This option permits more precise declaration of the terminal type when GDDM cannot automatically determine the correct terminal characteristics.

You must specify a device token with DSOPEN if you want to access GDDM through AP 126 while running APL2 in TSO batch. Otherwise AP 126 issues GDDM calls during AP 126 initialization that tell GDDM to use device characteristics of the current terminal type. Since no terminal exists in TSO batch, GDDM may hang or otherwise fail to initialize.

You also may need to specify a device token with DSOPEN if you are using a 24-line display screen under TSO. In this case, GDDM cannot determine whether the terminal type is a 3277 or a 3278 for a 24-line display screen. In such cases, GDDM simply assumes some terminal type that may not be correct. For more information about terminal types, see the description of the TERMCODE option below.

This option is meaningful only when the APL2 session manager, AP 126, or `)EDITOR 2` is used.

device-token

Selected device tokens supplied by GDDM include:

ADMK772A 3277 model 2 with APL

ADMK782A 3278 model 2 with APL

For more values, see the description of the device tokens in *Graphical Data Display Manager (GDDM) Base Programming Reference*.

An example of using the DSOPEN option is shown below: `DSOPEN(ADMK782A)`

EXCLUDE(*name...***)**

Specifies the module names of auxiliary processors normally available but which you do not want loaded at the start of your APL2 session. For example, to exclude AP 127, the SQL processor, from being loaded when you invoke APL2 in the TSO environment, include the EXCLUDE option in the APL2 command as follows:

```
EXCLUDE(AP2X127)
```

Figure 10 on page 48 contains the load module names of auxiliary processors supplied with the APL2 Licensed Program. Check with your system administrator to find out the names of any additional processors that may be automatically available at your installation.

Caution: Excluding auxiliary processors can reduce storage requirements for APL2, particularly on TSO. However, excluding certain IBM auxiliary processors may cause problems because of internal APL2 dependencies on these processors. The following auxiliary processors may be safely excluded, if users do not need them: AP 119, AP 120, AP 121, AP 123, AP 124, AP 127, AP 210, and AP 211.

FREESIZE(*size***)**

Specifies the amount of virtual storage that must be unused after space is allocated for the active workspace, shared variables, and other areas allocated during invocation. These areas include modules and work areas used by other products such as VSAM and GDDM. FREESIZE may be needed during the session for the APL2 interpreter module, auxiliary processor modules, access method buffers, dynamically loaded modules, storage control blocks, and program products such as GDDM.

size

An integer expressed in bytes, kilobytes, or megabytes. For example:

```
FREESIZE(65536)
     or
FREESIZE(64K)
```

A percentage of your virtual machine size. For example: `FREESIZE(10%)`

Your installation provides a default value for FREESIZE. If the minimum amount of FREESIZE is not available, APL2 invocation fails.

Because of the number of variable factors associated with APL2 storage allocations, you may find it better to omit the FREESIZE option and use the WSSIZE and SHRSIZE options to reduce the amount of space allocated to the active workspace and shared variables. If you cannot reasonably reduce WSSIZE and SHRSIZE and you are having virtual storage problems, you must increase your TSO region size.

HILIGHT(*setting***)**

Note: This option does not apply to APL2 Application Environment

Specifies whether input, output, or both are to be highlighted on the screen. This option applies, regardless of whether the APL2 session manager is being used.

setting
One of the following:

INPUT Highlight only input lines.

OUTPUT Highlight only output lines. **(default.)**

ON Highlight all lines.

OFF Highlight no lines.

For example, to have no lines highlighted during your APL2 session, specify:
`HILIGHT(OFF)`

ID(*nnnnnnn***)**

Specifies a numeric identifier to be associated with your current APL2 session. The number becomes the first item in the system variable ⎕*AI* (see *APL2 Programming: Language Reference*). This number identifies your:

- Default library for saved workspaces (including any *CONTINUE* workspace)
- Default library for APL data files
- Library for APL2 session manager log files
- Library for)*COPY* work files

The number you enter in the parameter to the ID option is also used to identify you as a possible share partner for shared variable communication between users on the same system. The value of the ID parameter does not affect a user's ability to share variables across systems. TCP/IP profile files are used to define potential cross-system partners.

nnnnnnn
Should be at least 1000 to avoid conflict with auxiliary processor identifiers (which are usually 100 through 999). The number cannot be greater than 9999999.

For example, to identify yourself as user 1234 when you invoke APL2, specify:
`ID(1234)`

If two or more APL2 users or auxiliary processors have the same ID number, only one of these users can communicate with the shared variable processor (SVP).

Your installation has the ability to set or change your ID and to override any value you provide. It also has the ability to restrict the use of user-to-user shared variables on the same system. Check with your system administrator for APL2 ID requirements at your site.

Unless your installation overrides your specification, if you do not specify an ID (or if you specify ID(0)) when you invoke APL2, you are not permitted to share variables with other users except using cross-system shared variables.

INPUT(**'** *string***'** ....)

Specifies one or more input lines used when APL2 is invoked. These lines are processed before APL2 requests input from any other input source—the program stack, the terminal, or, in the case of batch or controlled invocation, an input file (see TERMCODE on page 63).

' *string***' . . .**
Each character string represents a line of input to APL2. Strings are separated by one or more blanks or commas.

Each string is enclosed in a pair of quotation marks. If quotation marks are a part of an expression, a *pair* of single quotation marks must be entered for each *single* quotation mark in the expression.

The example below illustrates the use of the INPUT option to load an APL2 workspace named *PAYROLL*, and then execute a function named *START* with an argument *'ABC'*. `INPUT(')LOAD PAYROLL' ' START ''ABC''')`

Note: If you do not specify the INPUT option when invoking APL2, the APL2 session begins with the *CLEAR WS* message or the loading of a *CONTINUE* workspace. If you have a damaged *CONTINUE* workspace and want to suppress the automatic loading of it, you can specify the INPUT invocation option with no data:

```
INPUT('   ').
```

Cautions: If you specify the INPUT option and a *CONTINUE* workspace exists, you receive a message warning that a *CONTINUE* workspace exists, but it is not loaded. If the warning appears, you may want to load the contents of your *CONTINUE* workspace and save it into a workspace of a different name. Otherwise, forced termination of your session may cause your active workspace to be saved in the *CONTINUE* workspace, whose previous contents are lost.

If you invoke APL2 from a CLIST and pass a quoted string as a parameter, the CLIST processor strips off the single quotation marks around the strings. The sample CLIST below shows the recommended method of invoking APL2 with a symbolic INPUT parameter:

```
APL2.CLIST
PROC 0 IN('')      /* specify INPUT as a parameter */
CONTROL NOLIST NOPROMPT NOMSG
APL2 IN('&IN')   /* note the enclosing quotes */
```

You can invoke the CLIST by typing: `APL2 IN(')LOAD PAYROLL')`

When APL2 is invoked from a CLIST, all lowercase characters and numbers are folded to uppercase. Some APL2 characters cannot be passed to APL2 if the INPUT option is used within a CLIST. You can avoid this restriction by invoking APL2 without using a CLIST.

For more information, see *OS/VS2 TSO Terminal User's Guide*.

The **AISIZE** parameter must provide enough space to hold all INPUT strings.

LOADLIB(*dsname...***)**

Specifies one or more MVS private load libraries from which auxiliary processors, Processor 11 programs, or secondary APL2 modules (including the interpreter) may be loaded. The LOADLIB option is an alternative to the ALLOCATE command issued for load libraries needed during your APL2 session. You can use this option to:

- Specify the load library that contains an auxiliary processor specified in the APNAMES invocation option
- Replace, for your current APL2 session, the APL2 interpreter module, AP2INTRP (to test an APAR fix, for example)
- Identify a task library for modules that are loaded by AP 100 in response to the **APL ATTACH** built-in command
- Identify a library of modules loaded by Processor 11.

When you specify a load library with this option, APL2 makes the listed data sets part of the MVS TASKLIB search for the duration of the APL2 session.

Library names are separated by one or more blanks. For example, to specify that user library *userid*.MY.LOADLIB and system library PROD.PAY.LOADLIB are to be searched for modules that are used during your APL2 session, specify the following: `LOADLIB(MY.LOADLIB 'PROD.PAY.LOADLIB')`

A maximum of 111 dataset names can be specified. If ddname LOADLIB was previously allocated, it is replaced. The ddnames LOADLIB0 through LOADLIB9 are used temporarily as needed, and if more than 11 datasets are listed, ddnames LOADLI00 through LOADLI99 are also used temporarily. These names must not be in use when APL2 is invoked with the LOADLIB option.

Note: If an auxiliary processor is in none of the load libraries specified in the LOADLIB option, the MVS system libraries are searched. You can duplicate the

effect of the LOADLIB option by using the ALLOCATE command. Prior to invoking APL2, allocate your libraries with the ddname LOADLIB. If you use the LOADLIB option in addition to allocation with the ddname LOADLIB, the LOADLIB invocation option overrides the allocation.

NLT(*language***)**

Allows users to override the installation default for the national language in their invocation EXEC or CLIST, and allows the language to be set before APL2 is running. For example:

```
APL2 NLT(ESPANOL)
```

For a list of the national languages supported by APL2, see *APL2/370 Programming: System Services Reference*.

PROFILE(*name***)** **(SMAPL Only)**

Specifies the name of the file containing the profile to be used by the APL2 session manager. During its initialization, the session manager executes a PROFILE LOAD command using the name that you specify. (See *APL2/370 Programming: System Services Reference*for further information.)

name
Second-level qualifier of the profile to be loaded. The first-level qualifier is the TSO profile-prefix and the third-level qualifier is VSAPLPR.

If you are using the session manager without specifying the PROFILE option, the profile named DEFAULT is loaded. (If more than one DEFAULT profile exists, the host system search order determines which one is loaded.)

If you are not using the session manager, the PROFILE option is ignored.

If you specify PROFILE( )—no profile name—the session manager does not execute a PROFILE LOAD command.

For further information on session manager profiles, see *APL2/370 Programming: System Services Reference*.

QUIET[**(ON|OFF)**]

ON
Prevents APL2 from displaying any output until APL2 prompts for input.

OFF
Permits APL2 to display output when APL2 prompts for input. It is the default.

For instance, if you use the INPUT option and the QUIET option in an APL2 command stack using AP 101, the alternate input (stack) processor, you can load a workspace and start an application without displaying the APL2 initiation messages

that would normally be displayed. If that application uses AP 101 to stack an)*OFF* system command, APL2 termination messages are suppressed.

Note: The QUIET option only applies to output from the APL2 language processor. All other output, such as that from AP 126, is not suppressed.

If you are using the session manager, the QUIET option does not suppress the initial display of the session manager screen if the session manager profile includes the DISPLAY(ON) command. To suppress initial display of the session manager screen, specify the PROFILE() option or load a session manager profile that does not include the DISPLAY(ON) command.

Use the external function OPTION to change the QUIET setting. See *APL2/370 Programming: Using the Supplied Routines* for more information.

RUN(['*locator*'] *function*)

This option is designed to simplify invocation of an external function as a part of entry to APL2.

locator
: Optional information to be used by processor 11 to locate the external function. If provided, this must be a character string that can be used as the first item of the left argument to ⎕*NA* for processor 11. When this information is provided, the external function must either reside in a namespace or be self-describing. The possible formats are:

  'member'
  : The name of a load module that is available through the normal load library search order (including any LOADLIB ddname or invocation option.)

  'library.member'
  : *library* is a ddname to which a load library that must be allocated before invoking APL2, and *member* is the name of a member in the library containing the function.

  If *locator* is omitted, the function must be described in a NAMES file entry for the *function* using the defaults NAMES files for the APL2 session.

function
: A 1 to 8 character APL name containing only alphanumeric characters (no ∆, _, ¯, or underbarred characters.) Note that lowercase letters are converted to uppercase while processing the invocation RUN option.

For more information, see *APL2/370 Programming: System Services Reference*. The RUN option produces a pair of statements that are executed before anything provided by the INPUT option, the stack, of the APLIN file. The first statement is a ⎕*NA* for the requested function, and the second is a simple niladic invocation of it.

RUN provides only minimum control of application invocation. For more complex situations, use the INPUT option or provide an APLIN file.

SHRSIZE(*size*)

Specifies the amount of virtual storage to be reserved for the shared variable processor. The size of shared variable storage limits the volume of data that can be assigned to shared variables at any given time.

size
An integer expressed as bytes, kilobytes, or megabytes, as in the following example:

```
SHRSIZE(256000)
      or
SHRSIZE(250K)
```

A percentage of maximum size. For example: `SHRSIZE(5%)`

Minimum size: 16K bytes
Maximum size: Less than 16 megabytes
IBM-supplied default: 40K bytes

These sizes may be changed by your installation.

Note: Because of rounding, the actual SHRSIZE size assigned to your APL2 session may be slightly different from what you specify. Issue the *)QUOTA* system command to display the actual share size used. Your installation may allocate additional space for shared storage to support user-to-user shared variables. This space is not reported in the *)QUOTA* command. The *)QUOTA* command is described in *APL2 Programming: Language Reference*.

Typically, SHRSIZE values should be smaller than WSSIZE.

In a non-XA environment, SHRSIZE and WSSIZE specify areas that are allocated below the 16M line; in an XA environment, they specify areas allocated above the line, unless invocation XA(24) is specified.

SMAPL(TRY|ON|OFF|*nnnn*)

Note: This option does not apply to APL2 Application Environment.

Indicates whether you want to use the APL2 session manager for your APL2 session. The session manager requires GDDM and an IBM 3270 series display station.

TRY
Invokes the APL2 session manager if it is available.

TRY is the default setting.

ON
Invokes the APL2 session manager.

If the session manager is not available and you specify SMAPL(ON), you receive a message, and your APL2 session is not initialized.

OFF
Does not invoke the APL2 session manager.

If you specify SMAPL(OFF), APL2 uses the standard input/output protocol of the host system. If you do not use the APL2 session manager, but GDDM is available, you can still use the Editor 2 and AP 126, the GDDM Processor.

nnnn
If the SMAPL value is numeric, it indicates that the Shared Variable Interpreter Interface is to be used. The APL2 interpreter shares a variable with processor *nnnn*. All subsequent input and output to the interpreter is performed through the shared variable.

Note: Your terminal appears to become inactive.

The Shared Variable Interpreter Interface is designed to allow the interpreter to be controlled by another user ID, using an APL2 session manager or an APL2 function. The other ID can be on the same MVS system, or can be on a different system, even a completely different type of system, provided the two systems are connected through TCP/IP. Once a variable is shared with the interpreter, the interpreter sends messages, arrays, and requests for input through the shared variable.

For further details about the shared variable interpreter's protocols, consult *APL2/370 Programming: System Services Reference*. For information about how to interactively communicate with the interpreter from another TSO or CMS session, consult the discussion of the `RAPL2` function in *APL2/370 Programming: Using the Supplied Routines*.

SVMAX(*nnnnn*)

Specifies the maximum number of shared variables you can share concurrently.

nnnnn
Must be a positive integer.

Minimum value: 4
IBM-supplied default: 88
Maximum value: 32767

The default value may have been changed during installation.

To display the current value of this option after you invoke APL2, issue the)*QUOTA* system command.)*QUOTA* is described in *APL2 Programming: Language Reference*.

Comment: The maximum number of shared variables is also limited by the size of shared storage. Each shared variable requires at least 128 bytes of space in shared storage.

SYSDEBUG(*nnn*)

Establishes special debug settings for your APL2 session. These settings provide information beyond that provided by the DEBUG option. They are intended for use by system programmers in diagnosing system or internal APL2 problems or problems with writing an auxiliary processor. They are not for use during normal APL2 operation; their use can significantly degrade APL2 performance.

For a description of the SYSDEBUG option, see *APL2/370 Diagnosis Guide*.

TERMCODE(*nnnnn*)
or
CODE(*nnnnn*)

Used by APL2 to identify the type of terminal you are using.

If you do not specify this option, you may be prompted to enter a *shift-6* character if APL2 cannot determine your terminal type dynamically. This *shift-6* character allows APL2 to identify your terminal.

If you are using the session manager or AP 126 and GDDM is unable to correctly identify your terminal type, use the DSOPEN invocation option rather than TERMCODE to specify the correct terminal type.

nnnnn
Code identifying the terminal.

The value for the TERMCODE option must be one of the IBM-supplied device codes shown in Figure 11 on page 63.

TERMCODE(-1) can be used to request controlled invocation.

The invocation parameter TERMCODE(-1) indicates that APL2:

- Is being invoked in a “controlled invocation” environment
- Is to use the file allocated to ddname APLIN to satisfy its input requirements.
- Is to put all its output to the file allocated to the ddname APLPRINT.

The use of TERMCODE(-1) is described in detail in *APL2/370 Programming: System Services Reference*.

The APLPRINT file can have the following characteristics:

- The record format (RECFM) can be F, FB, V, or VB. The default RECFM is VB.
- The record format can also indicate either ANSI carriage control (A) or machine carriage control (M).
- The record length (LRECL) can be up to 255, including the record descriptor word (RDW) for variable-length record files (RECFM=V or VB). The default LRECL is 125. The default block size (BLKSIZE) is LRECL for fixed-length record files (RECFM=F or FB) or LRECL plus 4 (the length of the block descriptor word (BDW) for variable-length record files (RECFM=V or VB).

Figure 11. Device Codes for the TERMCODE Option

Code	Description
-1	Controlled invocation. APL2 avoids using the terminal if controlled invocation is used. Instead, APL2 redirects input and output requests to files, much as if it were running in TSO batch or on a disconnected virtual machine under CMS. Controlled invocation is intended for use by applications that are themselves using the terminal and that do not want APL2 to interfere with their terminal input and output. **Note:** TSO translates certain characters when entered using a CLIST. If you want to specify this termcode using a TSO CLIST, use the TSO minus character ('-') instead of the APL overbar ('¯').
0	Unknown terminal type. APL2 attempts to determine the terminal code from the available system information. If insufficient information is available, the APL2 characters may be displayed or translated incorrectly.
1	Pass through translation. The APL2 system passes characters to TSO without translation.
2	In MVS batch execution, this code uses the Technical Notation (TN) translation for: • Output directed to the data set identified by ddname APLPRINT. Such translation is useful when output is directed to impact printers that have the TN print chain (train), instead of the APL print character set.
27411	IBM 2741 terminal with correspondence code using type element 987 for the APL feature.
27412	IBM 2741 terminal with BCD or EBCD code using type element 988 for the APL feature.
3101	IBM 3101 terminal.
3178	IBM 3178 terminal without the APL feature.
3179	IBM 3179 terminal without the APL feature.
31791	IBM 31791 terminal with the APL feature.
3180	IBM 3180 terminal without the APL feature.
31801	IBM 3180 terminal with the APL feature.
3232	IBM 3232 terminal.
3270	IBM 3270 terminal with no lowercase or APL Feature. Lowercase input and output are folded to uppercase.
3277	IBM 3277 terminal without the APL Feature. Uppercase and lowercase characters are permitted.
32771	IBM 3277 display station with the Data Analysis-APL Feature code 1066.
3278	IBM 3278 without the APL Feature.
32781	IBM 3278 with the APL Feature code 1120.
3279	IBM 3279 terminal without the APL Feature.
32791	IBM 3279 terminal with the APL Feature code 1120.
3290	IBM 3290 terminal without the APL Feature.
32901	IBM 3290 terminal with the APL Feature.
3335	ASCII terminal without an APL Feature.
33351	ASCII terminal with APL typewriter-pairing keyboard arrangement.
33352	ASCII terminal with APL bit-pairing keyboard arrangement.
3767	IBM 3767 without the APL Feature.
37671	IBM 3767 with the APL Feature.
8775	IBM 8775 without the APL Feature.
87751	IBM 8775 with the APL Feature.

TRACE(*nnn*)

Provides system diagnostic output during your APL2 session. The option is intended for use by system programmers in diagnosing system or internal APL2 problems. It is not for use during normal APL2 operation and can significantly degrade APL2 performance; its use also interferes with normal terminal communication.

For a description of the TRACE option, see *APL2/370 Diagnosis Guide*.

WSSIZE(*size*)

Specifies the amount of *contiguous* virtual storage in your virtual machine to be reserved for your active workspace.

size

Integer expressed in bytes, kilobytes, or megabytes, as in the following:

```
WSSIZE(1048576)

WSSIZE(1024K)

WSSIZE(1M)
```

The size can also be expressed as a percentage of the TSO region size. For example:

```
WSSIZE(40%)
```

Note: Under MVS/XA, you may use numbers larger than 100% to obtain an extended region size larger than your TSO private region.

Minimum size: 16K bytes

Maximum size: APL supports up to 999 1008 megabytes (except that the TSO VSAM library system imposes a limit of 128 megabytes). The available storage may be limited further by your system.

IBM-supplied default: 25% of region size

You can issue the)*QUOTA* system command after invoking APL2 to display the default size of the active workspace. The)*QUOTA* command is described in *APL2 Programming: Language Reference*.

XA(*nn*)

Identifies the address range from which working storage should be allocated on XA or ESA systems.

nn One of the following:

24 Working storage should only be allocated below the 16-megabyte boundary.

31 Working storage may be allocated either above or below the 16-megabyte boundary.

If no XA() value is specified, then working storage is allocated where ever it is available. On XA or ESA systems, this may be above the 16-megabyte boundary.

IBM does not supply a default setting for XA(). Your installation may supply a default, or specify an overriding value.

If you are on a system that does not support XA or ESA mode addressing, specifying XA(31) causes invocation to fail.

Even when XA(31) is specified or defaulted, some pieces of working storage must be allocated below the 16-megabyte line due to macro or access method restrictions.

Session Termination

When you issue the system command)*OFF* or)*CONTINUE*, control returns to TSO so that you can continue your TSO session. If APL2 was invoked from a CLIST, the CLIST may regain control if coded to do so.

When APL2 is successfully terminated, any unused lines on the AP 101 input stack are passed to TSO as if they formed a command procedure (CLIST).

If APL2 is reinvoked as a result of a stacked APL2 command, the input stack for the new session is empty, but any previously stacked lines following the APL2 command remain in the CLIST, which regains control when APL2 terminates again.

Appendix G, “Sample Invocation CLISTs” on page 185 contains TSO CLIST examples.

Session Interruption

A line interrupt, repeated attention signals, or a system or operator cancel can force termination of an APL2 session. An abnormal termination purges lines on the AP 101 input stack. During such termination, however, APL2 attempts to save your active workspace into a workspace named *CONTINUE* in your default library. Your default library is the one identified by the ID invocation parameter.

If you log on again and a *CONTINUE* workspace exists in your default library, APL2 displays a message such as the one below, instead of the *CLEAR WS* message: *SAVED* 1992-03-27 18.22.57 (*GMT*-4)

Check the contents of the *CONTINUE* workspace using the)*NMS* command. If you want to save the data, you can use the APL2)*WSID* and)*SAVE* system commands to rename and save the *CONTINUE* workspace. If you do not save the data and another interrupt occurs, APL2 writes the contents of the active workspace into the *CONTINUE* workspace, replacing any previous data.

The *CONTINUE* workspace is autosaved into the user's default library, which may be either SAM or VSAM:

1. If a W0 ddname (or W*nnn* ddname where *nnn* is the default library) has been allocated, the *CONTINUE* is saved in that VSAM library.
2. If the autosave into the user's VSAM default library fails, APL2 attempts to save the *CONTINUE* workspace into the user's default SAM library.
3. Whether or not the first autosave is into the VSAM or SAM default library, APL2 attempts to drop the SAM library *CONTINUE* workspace, and tries the autosave again if the autosave into the SAM library fails.
4. If the drop or the second autosave into the SAM default library fails, APL2 attempts to dump the active workspace (as DUMP*nnnn*) into the user's default SAM library.
5. If none of these operations can be done, then APL2 terminates without saving an active workspace.

If the active workspace was either autosaved or dumped into the user's SAM default library, the user has to invoke APL2 with a different ID, or without allocating a VSAM default library in order to retrieve the data. You can allocate other VSAM libraries while retrieving the data. For example, if your ID was 1001 when the *CONTINUE* workspace was autosaved into the SAM library, you could allocate your normal default library as W1000. This allocation would permit you to resave the data in your normal default library by specifying library 1000.

When your TSO user ID is not the same as the PREFIX setting of the TSO PROFILE command, APL2 uses the ddname CONTINUE to access the *CONTINUE* workspace in your default SAM library. Because of this, you can prevent simultaneous access of the *CONTINUE* workspace by two TSO users sharing the same prefix, or by a batch job and your TSO session.

Allocate a data set to ddname CONTINUE. If you do not, and you attempt to access the *CONTINUE* workspace in your default SAM library, you receive the error message *IMPROPER LIBRARY REFERENCE*. If this happens during a forced session termination, your active workspace is dumped.

If you allocate the ddname CONTINUE and you use the)*LIB* system command to list the names of the workspaces in your default SAM library, the name *CONTINUE* appears as the first workspace in the library. All other names appear in alphabetic order following it. Only during)*LOAD* and)*COPY* operations does APL2 check whether the file allocated to the ddname CONTINUE actually contains a real APL workspace.

If you use the)*DROP* system command to drop the *CONTINUE* workspace in your default SAM library, APL2 empties the data set allocated to the ddname CONTINUE. The empty data set remains allocated, and the name CONTINUE appears in)*LIB* reports for your default library.

Chapter 5. Customizing APL2

You can customize APL2 to meet the user needs that you identified in the installation plan. This chapter contains instructions for:

- Changing the system options
  - AP2TIOPT system options (for APL2)
  - AP2TIOPX system options (for APL2 Application Environment)
  - AP2XAPIC system options
  - Default and overriding invocation options
  - User-information options
  - Range of SAM libraries to which users are authorized
- Extending or modifying national language messages and command files
- Tailoring installation exits
- Customizing the default session manager profile
- Establishing the installation exit for the global SVP
- Making user-written auxiliary processors available

The AP2TIOPT/AP2TIOPX/AP2XAPIC and user exit changes are accomplished by means of a user modification (USERMOD) applied to the APL2 Licensed Program using SMP.

The procedure to create and apply a USERMOD is the same in each case:

1. Source updates are coded by the user; IEBUPDTE control statements are used. (See the descriptions on customizing in this chapter.)
2. Source updates and IEBUPDTE control statements are embedded in the SMP control statements. (See job “AP2JUSRE” on page 132.)
3. The USERMOD is uniquely named.
4. The USERMOD is RECEIVEd. (See job “AP2JUSRE” on page 132.)
5. The USERMOD is APPLYed. (For APL2, see job “AP2JBAPE” on page 95. For APL2 Application Environment, see job “AP2JEAPE” on page 117.)

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6. The USERMOD is ACCEPTed. (For APL2, see job “AP2JBACE” on page 97. For APL2 Application Environment, see job “AP2JEACE” on page 119.)

   The USERMODs to the APL2 licensed program are RECEIVEd independently of the product. They can be APPLYed as part of the APPLY of the product or at any time after the APPLY of the product. Likewise, they can be ACCEPTed as part of the ACCEPT of the product or at any time after the ACCEPT of the product.

   For details on the IEBUPDTE program, see *OS/VS2 MVS Utilities*. For details on USERMODs, see *OS/VS2 MVS System Modification Program (SMP) System Programmer's Guide* or *System Modification Program Extended (SMP/E) User's Guide*.

Changing the System Options

The system option values are specified in the AP2TIOPT module for APL2 and in the AP2TIOPX module for APL2 Application Environment. If you want to change any of the system options, examine the AP2TIOPT or AP2TIOPX module source, and determine where you need to make modifications. Appendix C, “AP2TIOPT/AP2TIOPX/AP2XAPIC Option Modules Source Listing” on page 135 lists the complete AP2TIOPT/AP2TIOPX system option module source code. The following three subsections describe the three types of system option changes you may make.

Changing AP2TIOPT/AP2TIOPX System Options

The system options are parameters that can tailor certain aspects of the APL2 product to the individual requirements of its user community. They allow you to:

- Change the default name qualifiers for SAM workspaces and the session manager profile
- Provide data set allocation parameters for SAM libraries
- Change the default National Language Translation and time zone for system commands and messages
- Identify auxiliary processors to be permanently linked with APL2

You can change the default system options to meet the requirements of your installation. Appendix D, “APL2 System Options and Invocation Options” on page 148, describes the APL2 system options and their default values.

If you modify the RESAPS constant, you should be aware that AP2T100 and AP2T111 are required for the correct execution of certain system commands.

Note: If you modify the CSVPID option, and you have the full APL2 product, you should modify it in both AP2TIOPT and AP2TIOPX. (AP2TIOPX is included in module AP2TAPV2.)

Changing Default and Override Options

APL2 provides a set of invocation options, as defined in *APL2/370 Programming: System Services Reference*. (Two additional options, SYSDEBUG and TRACE, are defined in *APL2/370 Diagnosis Guide*.) The values used for these options during a particular APL2 session are merged from several sources:

- Users may specify options when invoking an APL2 CLIST
- The CLIST may override, ignore, or modify some of these options
- For any options not specified above, the installation defaults, if any, are applied
- Any installation overrides are applied
- The APL2 system provides defaults for any options not specified above

You set the installation defaults and installation overrides by modifying constants in the system options module. APNAMES and EXCLUDE subparameters are merged on an individual name basis with EXCLUDE overriding APNAMES. AP2X104 should not be excluded, as it is required for certain system commands.

DEBUG, SYSDEBUG, and TRACE values are actually treated as 8-bit Boolean values (for example, 5 is really 00000101) and merged on a bit-by-bit basis. Negative values turn off the specified bits.

Figure 12 shows an example of an IEBUPDTE control statement and Assembler language source statements you might code to specify a set of default invocation options different from those distributed with the APL2 Licensed Program. Specifically:

- An increased data area for use by AP 101 (see AISIZE)
- The use of United States date format (see DATEFORM)
- Large dumps in case of error
- The designation of the terminal type (see TERMCODE)
- A fixed workspace size (see WSSIZE)

```
./ CHANGE NAME=AP2TIOPT
         DC    C'AISIZE(8K)'      *** INCREASED STACK SPACE ***         01101980
         DC    C'DATEFORM(US)'    *** US DATE FORMAT ***                01125900
         DC    C'DEBUG(4)'        *** PRODUCE EXPANDED DUMPS ***        01137870
         DC    C'WSSIZE(512K)'    *** FIXED WORKSPACE SIZE ***          01273920
./ ENDUP
```

Figure 12. Example of IEBUPDTE Control Statements and Assembler Source Statements

For the AP2TIOPT and AP2TIOPX option modules source listing, see Appendix C, “AP2TIOPT/AP2TIOPX/AP2XAPIC Option Modules Source Listing” on page 135.

Changing the User-Information Options

APL2 users can issue the AP 100 “APL USER” command during APL2 sessions to obtain information about the APL2 system. You can change some of the information returned by that command. You can change the values by modifying constants at the end of the system options module. Figure 13 describes the information that can be changed.

Figure 13. APL2 User Information Options

Parameter	Use to Change:	Default
USRAPLN	The name displayed for APL2.	APL2
USRTPAMN	The name displayed for the terminal access method.	ACF/VTAM
USRTPAML	The release level displayed for the terminal access method.	2.0
USRGDMN	The name displayed for the Graphical Data Display Manager. (If you do not have GDDM installed, change this name to blanks.)	GDDM
USRGDML	The release level displayed for GDDM.	V3R1.0
USRRACN	The name displayed for Resource Access Control Facility.	RACF
USRHSMN	The name displayed for the Hierarchical Storage Manager.	HSM
USRHSML	The release level displayed for HSM.	2.2.1

This information should be updated as changes occur in the referenced system components.

Changing the AP2XAPIC Command Options

The AP2XAPIC command options module specifies what module name and invocation options are used when APL2 is invoked by APL2PI. The command option values are specified in the AP2XAPIC module for both APL2 and APL2 Application Environment. If you want to change the APL2PI command options, examine the AP2XAPIC module source and determine what modifications to make. Appendix C, “AP2TIOPT/AP2TIOPX/AP2XAPIC Option Modules Source Listing” on page 135 lists the complete AP2XAPIC command option module source code.

Extending or Adding National Language Message and Command Files

A set of national language message and command keyword definition files has been distributed with APL2. These files may be tailored by an installation using standard editors. Each file is identified by a 1- to 8-character language name (called “lang” here) that can be assigned to the $\square NLT$ system variable.

The file is stored as membername “lang” within a Partitioned Data Set. That PDS (or a concatenation of such PDSs) must be allocated using DDNAME APL2LANG. APL2 only looks for the DDNAME. It does not do any allocation. The data set must be defined as containing fixed length 80-byte records.

The syntax used for defining message and command text permits trailing comments. The record formats (defined below) permit trailing comments in any record. This also means that records may be numbered on the right, and any such numbers are ignored by APL2, so long as column 72 is blank. If the records are not numbered, they may contain data through column 80. No data in the records is column sensitive. Any number of blanks may be inserted before any field.

```
* [comments]
```

Comment records may be placed anywhere in the file.

```
DBCS number [comments]
```

This record is optional, but may be used only as the first noncomment record in the file. It identifies the language as being represented in a Double Byte Character set (DBCS), and specifies the character set number. The number must be between 0 and 4095. Its value (converted to binary) is used as the high-order half of all non-APL characters in APL Extended Character representation.

```
lang classno [comments]
```

This record is used to begin a set of message or keyword definitions. Class 1 is used for messages. Other class numbers are used for keywords, beginning with session manager keywords in class 2. The language class records need not appear in class number order, but after a class is started, all definitions within that class must be given before the next language class record.

Note that “lang” must match the file name, and that “classno” must be a class number that is also available within the base English message/keyword definition. Those class numbers are defined in the DEFAULT APL2LANG file.

```
itemno [fieldno] ['string'] [comments]
```

This record is used for the first or only line defining an individual message or keyword. The records need not appear in item number order, but an item number may be defined only once within a class group. Messages (but not keywords) may be built of a number of fields. However, no more than the two fields shown may be defined by one line in the file.

The “itemno” is either a message number or a keyword number (as defined in the DEFAULT APL2LANG file).

“fieldno” is always omitted for keywords and may be omitted for messages. For messages that begin with a string that is dynamically substituted, it is the message substitution field number. Those numbers are identified in the AP2XMSGS macro.

'string' is required when “fieldno” is omitted. It must always be enclosed in apostrophes, as shown. Any imbedded apostrophes must be doubled: for example, 'DON''T DO THAT'. When DBCS characters are being used, the enclosing apostrophes must be in EBCDIC. Any DBCS characters used must be bracketed by shift-out (X“0E”) and shift-in (X“0F”).

Note: APL2 never adds blanks before or after substitution fields or quoted string fields. If two fields in a message should be separated by a blank, the blank must be coded within a quoted string.

```
- [fieldno] ['string'] [comments]
```

This is used as a continuation for an item record. The hyphen must be coded as shown, and followed by at least one blank. Any substitution field or string field defined here immediately follow the fields defined in the previous record.

Extending or Adding National Language Help Files

A set of national language help files is distributed with APL2. These files may be tailored by an installation using standard editors. Each file is identified by a 1- to 8-character language name (called "lang" here) that can be assigned to the $\square NLT$ system variable.

The file is stored as membername "lang" within a Partitioned Data Set (PDS). That PDS (or a concatenation of such PDSs) must be allocated using DDNAME APL2HELP. APL2 only looks for the DDNAME. It does not do any allocation. The PDSs may be fixed or variable record format.

At most 72 bytes of each record are used. This means that records may be numbered in columns 73-80, and any such numbers are ignored by APL2.

```
.* [comments]
```

Comment records may be placed anywhere in the file.

```
:HELP.Key
```

Key — is any character vector up to and including byte 72 of the record. Trailing blanks in the key are ignored. Blanks occurring before the last nonblank are significant.

A record starting with a :HELP. tag delimits the start of a Help text entry. The entry continues until the next record starting with :HELP or the end of the file.

```
:HELP Filename.Key
```

Key — is any character vector up to and including byte 72 of the record. Trailing blanks in the key are ignored. Blanks occurring before the last nonblank are significant.

Filename — is a 1- to 8-character name identifying a name of another member available in the PDS(s) allocated to DDNAME APL2HELP. This file contains the Help text entry associated with the Key. The entire contents of the file is used as the entry except for comment records that are ignored.

Consult the comments in the DEFAULT file in the APL2.SAP2HELP target library distributed with APL2 for further details on the format of help files.

Customizing Installation Exits

APL2 provides for installation exits at significant points in its processing. Specifically:

- At the start and end of user sign-on and sign-off
- At the start of system command analysis (any entry beginning with a right parenthesis)
- At the start and end of)*LOAD*,)*SAVE*,)*DROP*,)*LIB*, and)*CLEAR* command processing
- At the start and end of AP 100 command processing
- At the start and end of the generation of the fully qualified data set name for a SAM library workspace
- At the start and end of the generation of the library pointer catalog entry pointing to a SAM project library workspace

You may optionally provide an installation exit routine that limits or modifies APL2 product processing of a number of user requests. The exit, if provided, is link-edited with the primary APL2 load module. The default exit name is AP2TIUSR, and a sample exit of that name is supplied with APL2. You may use the sample exit as distributed, modify it to your needs and use it, omit the exit entirely, or replace it with your own exit by providing a new name in the OPTUSER parameter of the AP2TITOP macro in AP2TIOPT.

Appendix F, “Installation Exit Routine” on page 155 provides complete descriptions of the interfaces, and comments on the sample routines provided. The appendix also includes a complete listing of the sample source. Note that the Assembler H product (5668-962) is required to assemble the sample in its current form. See “Step 9–Change the Default APL2 System Options and Installation Exits (Optional)” on page 31 for information about how to specify the assembler to SMP/E.

Examples of functions that can be performed by the installation exit routines are:

- Modifying the APL2 invocation command
- Providing additional local APL2 system commands
- Screening TSO commands issued by the user through AP 100
- Limiting access to certain workspace libraries

Customizing the Default Session Manager Profile

The session manager profile may contain settings for the following session manager commands:

- COPY
- PFK
- COLUMN
- DISPLAY
- LOG

Session manager logs are stored in the user's private file library, which is a VSAM cluster. If the installation does not intend to provide file libraries for its APL users, the LOG command should be removed. Removal of the LOG command results in temporary logs that are not kept across APL2 sessions.

When you use the session manager, it automatically executes a session manager PROFILE LOAD command as part of the APL2 invocation. If a profile name was specified in the PROFILE invocation parameter, that profile named is loaded. If no profile name was specified, the installation default profile is loaded. The installation default profile was created during installation (see installation "Step 18–Create the Default APL2 Session Manager Profile (Optional)" on page 36 and sample installation job AP2JPROF in Appendix A, "Sample JCL Statements" on page 86). The content of the installation default profile is shown in Appendix H, "Default Session Manager Profile" on page 191.

To find the profile, the APL2 system looks for:

1. Implicitly qualified data set *name*.VSAPLPR, where *name* is the profile name.
2. If not found, then explicitly qualified data set AP2V2R02.*name*.VSAPLPR, where AP2V2R02 is actually whatever is specified as the PUBQLFR installation constant.

In order to customize the default session manager profile, you should perform the following steps using a terminal with the APL feature:

1. Invoke APL2 with the session manager.
2. Use the session manager commands DISPLAY, COLUMN, COPY, and PFK to establish the settings you want for the customized default profile.
3. Use the session manager command PROFILE SAVE to save the customized profile. The name of the customized profile data set is:

   ```
   userid.DEFAULT.VSAPLPR
   ```

4. Delete or rename the current default session manager profile and rename the customized profile just saved to:

   ```
   AP2V2R02.DEFAULT.VSAPLPR
   ```

   where AP2V2R02 is the (default) value of the PUBQLFR system option.

You should not edit the installation default profile with an editor that removes trailing blanks from variable-length records.

For a complete description of the APL2 session manager, see *APL2/370 Programming: System Services Reference*.

Establishing the APL2 Installation Exit for the Global SVP

This section contains Product-sensitive Programming Interface and Associated Guidance Information.

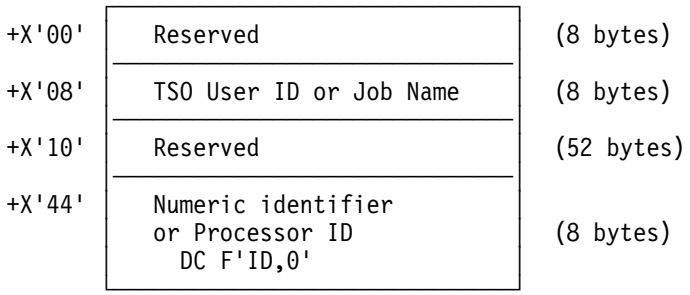
The global Shared Variable Processor (SVP) provides an installation-written exit under APL2. This exit routine allows an installation to assign or verify the user's numeric identifier. This numeric identifier is used for shared variable and certain other operations (see the ID invocation option in *APL2/370 Programming: System Services Reference*) when APL2 is invoked, and to assign or verify the processor ID used by global auxiliary processors (APs). Installations using the global SVP must provide this exit routine to ensure security. If the exit routine is not provided, all users who invoke APL2 with the ID invocation option are authorized to use the global SVP. APL2 users who have specified the same ID invocation option contend for use of the global SVP.

You should code and link-edit the exit routine as a separate module and place it in the same authorized library as the global SVP load module AP2TCSVS, the default being SYS1.LINKLIB. The name of the link-edited exit module is specified in the ISECNAME parameter in the parameter file used by the global SVP at startup. A description of the parameter file format, including keywords and their syntax, appears in Appendix B, “Startup Parameters for Global SVP” on page 133.

The exit routine specified in the ISECNAME parameter is executed when a user invokes APL2 or when a global AP is started. It has the ability to authorize or deny access to the global SVP for the duration of the user's APL2 session, or for a global AP. Additionally, the APL2 user's numeric identifier (specified by the ID parameter at APL2 invocation) or the processor ID used by a global AP may be changed or assigned by this exit routine.

The exit routine is entered in supervisor state, key 0, enabled, holding no locks. Under MVS/XA, it is entered in 31 bit mode and may reside above the 16 mega-byte line. In the MVS/XA environment, it should be link-edited with RMODE=ANY AMODE=ANY.

The program passes control to the exit routine with register 1 pointing to a control block containing the following information:



Register 13 points to a standard 18-word OS save area. Register 14 contains the return address, and register 15 contains the entry point address. The exit routine must preserve its caller's registers, except for register 15, which is set to zero to indicate the user or AP is authorized or to nonzero to reject the user or AP.

The exit routine may also change the numeric identifier or processor ID in the control block. Changing it to a value of zero has the effect of rejecting the user or the AP. On completion of the exit routine, if register 15 is set to zero and the numeric identifier is nonzero, APL2 uses the value of the numeric identifier as the first element of $\square AI$ and as the user's default private library number.

Making User-Written Auxiliary Processors Available

APL2 supports two types of auxiliary processors:

- Those written using the interface defined in *APL2/370 Programming: Processor Interface Reference*
- Processors carried forward from VS APL, and so written as defined by *VS APL for CMS and TSO: Writing Auxiliary Processors*

Processors written to the APL2 interface have no external references to APL2 product routines, so should be compiled and link-edited as separate load modules. Assembler mapping macros are provided for control blocks used in the interface, and these can be found in SMP/E distribution library `APL2.AAP2MACS`. The APL2 product imposes no particular requirements on linkage editor options used in building the modules.

- Programs intended for use as global auxiliary processors are run as a separate MVS job step. They are expected to call `AP2TAPV2` during initialization. IBM recommends that `LOAD` or `LINK` be used for this call to avoid problems with any future service to the module.
- Programs intended for use as local auxiliary processors are started during APL2 invocation. The APL2 product issues a `LOAD` for the names given in the `APNAMES` option, and calls the modules in the specified `AMODE`.

Processors written to the VS APL interface must be link-edited with a compatibility stub routine that is provided by the APL2 product. Note that neither this interface nor this process should be used for newly written auxiliary processors. IBM no longer recommends that you use VS APL auxiliary processors as global processors (in a separate MVS address space), however we do continue to distribute the `AP2TAPV1` stub for customers who are already using that facility. The remainder of this section describes the process of preparing a VS APL auxiliary processor for local use with APL2.

1. Assemble the auxiliary processor, creating an object module in either a sequential data set or as a member of a partitioned data set. The required VS APL service call and mapping macros are located in SMP/E distribution library `APL2.AAP2MACS`.
2. Edit the AP2JUSAP job:
   a. Specify the name of the data set containing the auxiliary processor object module in the APLIB DD statement.
   b. Specify the name of the distribution library for APL2 modules in the MODLIB DD statement.
   c. Specify the name of the target library for the auxiliary processor in the SYSLMOD DD statement. The target library can be:
      - The default target library for the APL2 load modules, SYS1.LINKLIB

- Specified in place of the default target library for the APL2 load modules
- Any library in the link list concatenation
- A data set referenced in the STEPLIB concatenation in the LOGON procedure used by APL2 users
- A data set allocated with the DDNAME LOADLIB prior to the invocation of APL2
- A data set named in the LOADLIB invocation parameter when APL2 is invoked

d. Modify the CHANGE linkage editor control statement, replacing "USAPNAME" with the name of the entry point in the auxiliary processor object module.

e. Modify the INCLUDE APLIB linkage editor control statement. Eliminate "USERAP" if the data set containing the auxiliary processor object module is sequential, or replace "USERAP" with the name of the member containing the auxiliary processor object module if the data set is partitioned.

f. Modify the NAME linkage editor control statement, replacing "AP999" with the name by which the auxiliary processor is to be known.

3. Execute the AP2JUSAP job.
4. Add the name of the auxiliary processor to the list of names in the APNAMES invocation parameter, in either the DEFAULT or OVERIDE invocation options in the system options module (AP2TIOPT for APL2 or AP2TIOPX for APL2 Application Environment), the APL2 command in the invocation CLIST(s) used, or in the APL2 command directly entered by the user.
5. To ensure that subsequent maintenance to the AP2TASVP module, which is included in the auxiliary processor load module, is reflected in that load module:
   a. Create a JCLIN file, based on job AP2JUSAP, showing the link-edit of the auxiliary processor.
   b. Create an SMP job that processes the JCLIN file generated above.
   c. Execute the job created.

Chapter 6. Administering the APL2 Environment

After APL2 is installed and customized, it requires ongoing attention to operate efficiently and to support APL2 application programmers and end users. This chapter provides information about:

- Running the global SVP
- Running the port server
- Making APL2 available
- Providing a local greeting message
- Providing calls to external routines
- Library administration
- Recustomization
- Documenting problems
- Maintaining APL2

Running the Global SVP

Start the global SVP manually from the operator's console by entering the command:

```
START APL2SVP
```

To shut down the global SVP, enter one of the following commands at an MVS/SP operator's console:

- For normal shutdown:

  ```
  MODIFY APL2SVP,STOP
  ```

  or

  ```
  STOP APL2SVP
  ```

- For shutdown with a dump:

  ```
  MODIFY APL2SVP,DUMP
  ```

To produce a SNAP dump of the AP2TCSVP and AP2TCSVR modules, shared storage, work areas, and trace areas:

```
MODIFY APL2SVP,SNAP
```

To deactivate tracing, to activate normal tracing, or to activate extensive tracing:

```
MODIFY APL2SVP,TRACE,OFF
MODIFY APL2SVP,TRACE,ON
MODIFY APL2SVP,TRACE,ALL
```

Note: Tracing degrades performance.

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To drop a user from the global SVP:

```
MODIFY APL2SVP,FORCE,userid
```

where *userid* is the TSO user ID or batch job name of the user to be dropped.

To restart the global SVP after shutdown:

```
START APL2SVP
```

APL2SVP is the name of the member of SYS1.PROCLIB containing the procedure that starts the global SVP subsystem.

The following list shows the return codes issued by the global SVP and their meanings.

```
VALUE      MEANING

    4      GETMAIN OF WORK AREA FAILED (SUBPOOL 241)
    8      GETMAIN OF BUFFER AREA FAILED (SUBPOOL 0)
   12      ENQUEUE OF SUBSYSTEM NAME FAILED
           (SUBSYSTEM IS PROBABLY ALREADY ACTIVE)
   16      SHARED MEMORY GETMAIN FAILED
   20      UNABLE TO INITIALIZE SHARED MEMORY
   24      UNABLE TO OPEN SNAP DCB
   28      NOT A STARTED TASK
   32      TRACE TABLE GETMAIN FAILED

  128+   PARSER ERRORS
           PARSER ERRORS MAY BE SUMMED TO INDICATE
           MULTIPLE ERRORS
  001      SVPNAME NOT SPECIFIED
  002      SMSIZE NOT SPECIFIED
  004      INCORRECT SMSIZE
  008      I/O ERROR READING SVPPARMS DATASET
  016      RESERVED
  032      RESERVED
  064      UNABLE TO OPEN SVPPARMS DATASET

     (FOR START OR STOP REQUEST)

  200      NORMAL COMPLETION.
  204      RESERVED.
  208      REQUESTED STATUS ALREADY ESTABLISHED.
  212      VARIABLE LENGTH PARMLIST ERROR.

     (FOR START REQUEST)

  216      FUNCTION MATRIX/ETD FAILURE.
  220      SUBSYSTEM SSCT BLOCK NOT CHAINED.
  224      SUBSYSTEM SSVT GETMAIN FAILURE.
  228      SUBSYSTEM SCSA GETMAIN FAILURE.
  232      SUBSYSTEM SSVT FREEMAIN FAILURE.
  236      LXRES GETMAIN FAILURE.
  240      LXRES RESERVE FAILURE.
```

```
244      LXRES FREEMAIN FAILURE.
248      ETCRE CREATE FAILURE.
252      ETCON CONNECT FAILURE.

   (FOR STOP REQUEST)

256      SUBSYSTEM SSVT NOT FOUND.
260      ETDES - (NO CONNECTIONS).
264      SUBSYSTEM SCSA FREEMAIN FAILURE.
268      SUBSYSTEM SSVT FREEMAIN FAILURE.
```

Running the Port Server

The port server is an external APL2 function that should be run in a started task on TSO.

The port server is called *SERVER*. Although it is typically started using the JCL procedure AP2PSRV, it can be accessed and started from an interactive APL2 session. It is accessed and started as shown below.

```
      3 11 ⎕NA 'SERVER'
1
      SERVER
Enter server port number (default 31415):
Enter server password: SECRET
```

Figure 14. Running the port server

The server prompts for the port number it should use. If no response is given, it defaults to using 31415. If a port other than 31415 is given, then users on the same system should use the APNAMES invocation option to inform AP 119 of the port number. For further details, see *APL2/370 Programming: System Services Reference*.

If a port other than 31415 is given, then users on remote systems need to specify the port number in their TCP/IP profile files or use the AP 119 SETLPORT command. For further details, see *APL2/370 Programming: System Services Reference*.

The server also prompts for a password that is required of users attempting to use restricted server commands. If no response is given, no restricted server commands can be used. The following restricted server commands are provided for administration of the port server. Consult the documentation of AP 119 in *APL2/370 Programming: System Services Reference* for information about their use.

PSLIST List the port server's table of registered users.

PSCLEAR Clear the port server's table of registered users.

PSSHUTD Shut down the port server.

Note: If the port server is run as a started task using the sample JCL procedure, the output of the PSLIST command is sent to the APLPRINT ddname that is allocated to SYSOUT. No result is visible until the port server is shut down.

The APL2 invocation option RUN can also be used to start the port server. In this case, the INPUT option would typically be used to supply the prompt responses. Examine the port server parameter file AP2XPSRV for a sample of using the RUN and INPUT parameters.

The port server maintains a table of active users of cross systems shared variables. This table is stored in the workspace of the APL2 session under which the port server is running. If a very large number of users are active, it is possible for the port server to hit a workspace full condition. If the port server hits a workspace full condition, it issues a *WS FULL* to it's session log. However, it does not terminate.

If users are unable to share cross systems shared variables, and there are very many active users, shutdown the port server and examine the session log. If one or more *WS FULL* messages were produced, use the WSSIZE invocation option in AP2XPSRV to increase the server's workspace size and restart the server.

If the server is run with a port number other than the default 31415, and if the default APNAMES invocation option was not changed to specify the port number, users should be informed of the port number.

Making APL2 Available

APL2 can be made available to the user community through:

- Invocation CLIST

  The invocation CLIST must reside in a data set accessible to all APL2 users. The CLIST allocates the appropriate libraries for user access and invokes APL2 with the appropriate invocation options.

- LOGON Procedure

  The LOGON procedure contains a STEPLIB DD statement to allow users to issue the command “APL2” and DD statements for the appropriate libraries for user access. If necessary, you then invoke APL2 with the appropriate invocation options (or use your own CLIST).

The APL2 administrator may:

- Initially, provide the invocation CLIST(s) or LOGON procedure(s). (See “Step 16–Prepare the APL2 Invocation CLIST” on page 35.)
- Keep the invocation CLIST(s) or LOGON procedure(s) current, adjusting for changes in the libraries, invocation options, and so forth.
- Modify the invocation CLIST(s) or LOGON procedure(s) for particular users or user groups, for end users rather than APL2 programmers, and so forth.

Some users or groups of users may need a customized CLIST. For example, an application may be more effective if users execute a CLIST that invokes APL2 and takes them directly into the application through use of the INPUT invocation parameter. (See Appendix D, “APL2 System Options and Invocation Options” on page 148.)

For details concerning CLISTs, see the sample invocation CLISTs in Appendix G, “Sample Invocation CLISTs” on page 185. For details concerning TSO LOGON procedures, see *OS/VS2 MVS Service Programming Library: TSO*. For further details concerning CLISTs, see *OS/VS2 TSO Command Language Reference* and *OS/VS2 TSO Terminal User's Guide*.

Providing a Local Greeting Message

When users invoke APL2 they see a set of messages like this sample:

```
    APL2 2.2.00 (English)
    Version 2 Release 2

CLEAR WS
```

The first line is determined by the system, as is the last line. But the line shown here as “Version 2 Release 2” is taken from a file that you can change at any time. You may provide any number of lines of replacement messages. You might want your users to see this:

```
    APL2 2.2.00 (English)
Call John Smith at 1234 for APL questions or problems.
Maintenance is scheduled for this weekend.

CLEAR WS
```

You can change the messages by editing the GREETING member of the dataset allocated to APL2 users as file APL2LANG. Each record in this file is displayed as it appears during APL2 invocation, except that:

- Lines containing an * in column 1 are ignored.
- Trailing blanks are deleted.

Providing for Calls to External Routines

APL2 applications and certain external routines written in languages other than APL can be called from APL2 through processor 11 and □*NA*. These routines can be packaged or compiled into load module libraries and possibly placed in the link pack area. A complete description of the procedures for preparing non-APL routines and APL2 workspaces for use through processor 11 can be found in the chapters entitled "Processor 11 - Access to Namespaces" and "Processor 11 - Calling Compiled Programs" in *APL2/370 Programming: System Services Reference*. Those discussions also include details on link-editing APL2 and non-APL routines and processor 11's search order rules.

The following provisions should be made for APL2 users calling non-APL or packaged APL2 routines:

1. If the name of the NAMES file was changed during the installation process from the default, the name used should be communicated to APL2 users so they can allocate the data set appropriately (see sample job AP2JBALC or AP2JEALC).

2. If the name of the NAMES file was changed during the installation process, the invocation CLISTs should be updated with the name used (see sample CLISTs AP2CLSTS, AP2CLSTV, and AP2CLSTE.)
3. The modules AP2TNL and AP2XCMAP in the target load module data set for APL2 should be made available for use in link-editing their environment programs. The name of this data set should be communicated to APL2 users.
4. The description of calling non-APL programs given in *APL2/370 Programming: System Services Reference* assumes that the C/370, PL/I., and FORTRAN subroutine libraries are not found in the conventional order of search - that is, job pack area, task library, step library, link pack area, and link library. If any of these subroutine libraries is found in this search, the APL2 users should be informed of this fact so they can remove the TASKLIB tags from their NAMES files or self-describing routines.
5. The exec AP2MP11L in the distribution data set APL2.SAP2SAMP should be made available for use in link-editing their non-APL programs. It should be placed in a library allocated in the normal exec search order.

Library Administration

The APL2 administrator can:

- Allocate new VSAM libraries.
- Delete obsolete VSAM libraries.
- Add new workspaces to public libraries.
- Delete obsolete workspaces from public libraries.
- Handle all “library full” conditions.
- Assign library numbers consistent with the numbering scheme for the installation.
- Keep the allocations in the invocation CLIST(s) or LOGON procedure(s) current with VSAM libraries.

For details of the above tasks, see “Planning the APL2 Libraries” on page 10.

Recustomization

The APL2 administrator may recustomize elements of the APL2 system in response to the changing requirements of the APL2 user community or changes in the host system environment.

- You may need to change:
  - System options in the system options module, AP2TIOPT or AP2TIOPX
  - Invocation options in the invocation CLIST(s)
  - DD statements in the LOGON procedure(s)
  - Invocation option default and overriding values in the system options module, AP2TIOPT/AP2TIOPX
  - User-information option values in the system options module, AP2TIOPT/AP2TIOPX, as the host system environment changes and as the APL2 maintenance or release level changes

  - Session manager default profile in the file AP2V2R02.DEFAULT.VSAPLPR
  - APL2PI invocation options in AP2XAPIC.
- You may need to add to or change the installation exits in sample module AP2TIUSR.
- You may need to assign new numbers to and install new user-written auxiliary processors, and adjust the value of the APNAMES invocation parameter in the invocation CLIST(s) or in the system options module, AP2TIOPT/AP2TIOPX.

For details on customizing the APL2 system, see Chapter 5, “Customizing APL2” on page 67.

Documenting Problems

Detailed procedures for diagnosing and reporting problems are found in *APL2/370 Diagnosis Guide*. You can shorten the time required to resolve a problem by gathering relevant documentation before you report the incident. The following serves to highlight some of the general techniques useful in diagnosing APL2 problems.

- What was the environment?

  Whenever you report a problem, you should be able to describe the level of MVS, APL2, and related products (such as GDDM) that were in use at the time of the failure. Furthermore, you might want to know what parts of APL2 were in use at the time of the failure.Chapter 1, “Overview of APL2 and the Installation Process” on page 1 , summarizes the basic components of an APL2 system.

- Is it reproducible?

  Perhaps the single most valuable piece of information in diagnosing problems is the minimum set of conditions to reproduce the failure. A problem that you can re-create can usually be solved quickly.

- Do I have a record?

  When a problem occurs intermittently, it can often be diagnosed by APL session manager logs with previous occurrences. These records of your session should be retained along with any dumps or damaged workspaces.

- Should I get a dump or trace?

  Dumps and traces are sometimes the only way to diagnose intermittent problems. APL2 provides several forms of dumps and traces you can use. For further information, see *APL2/370 Diagnosis Guide*.

Maintaining APL2

The APL2 administrator or system programmer must apply corrective and preventive maintenance or refresh releases to the APL2 product. Maintenance is distributed in a format acceptable to SMP/E. All maintenance includes a memorandum to users with instructions regarding the application of the maintenance; all refresh releases are accompanied by a program directory with instructions regarding the installation of the release.

Maintenance of all source, macros, modules, and sample jobs is accomplished through the standard SMP RECEIVE, APPLY, and ACCEPT steps.

Maintenance of all workspaces is accomplished through the standard SMP RECEIVE, APPLY, and ACCEPT steps, followed by an additional step, described below.

- If only a few workspaces are affected by maintenance:
  1. Invoke APL2 with the following command:

     ```
     APL2 SM(OFF) WSSIZE(600K) SHRSIZE(60K) FR(256K)
     ```

  2. Enter the following sequence of commands for each workspace affected by maintenance:

     a.)*CLEAR*

     b.)*IN* '*APL2.SAP2WKSP*(*wsname*)'

     c.)*RESET*

     d.)*WSID libno wsname: password*

     e.)*SAVE*

     where:

wsname	Is the workspace name.
libno	Is the public library number.
password	Is the password for the public library, if required.

- If more than a few workspaces are affected by maintenance:
  1. Create a new version of the installation job AP2JBTCH, modifying it to the workspaces affected by maintenance.
  2. Follow the instructions in “Step 17–Install the APL2 Workspaces” on page 35.

No maintenance is distributed for the fonts and symbol sets.

Appendix A. Sample JCL Statements

This appendix provides sample JCL statements for both the full APL2 product and for APL2 AE.

Sample JCL Statements for the Full APL2 Product

The following sample JCL statements are specific to the full APL2 product.

AP2JBTAE

AP2JBTAE copies sample JCL from the APL2 distribution tape.

```
//AP2JBTAE JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
//             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
//*
//*********************************************************************
//* APL2 VERSION 2 RELEASE 2                                          *
//* LICENSED MATERIALS - PROPERTY OF IBM                              *
//* 5688-228 (C) COPYRIGHT IBM CORP. 1984, 1994.                      *
//* SEE COPYRIGHT INSTRUCTIONS.                                       *
//*********************************************************************
//*
//*********************************************************************
//*  THIS JOB USES IEBCOPY TO RETRIEVE THE NECESSARY SMP/E SAMPLE    *
//*  JOBS FROM THE DISTRIBUTION TAPE FOR APL2.                       *
//*********************************************************************
//*
//RETRIEVE EXEC PGM=IEBCOPY
//SYSPRINT DD SYSOUT=*
//INPUT    DD UNIT=3480,DISP=OLD,
//            LABEL=(8,SL),DSN=HLO1222.F7,
//            VOL=SER=LO1221
//OUTPUT   DD DSN=USERID.APL2INST.JCL,DISP=(,CATLG),
//            UNIT=SYSDA,SPACE=(6160,(65,10,5)),
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160)
//SYSUT3   DD UNIT=SYSDA,SPACE=(TRK,(5,1))
//SYSUT4   DD UNIT=SYSDA,SPACE=(TRK,(5,1))
//SYSIN    DD *
 COPY INDD=INPUT,OUTDD=OUTPUT
 EXCLUDE MEMBER=(AP2JESME,AP2JEALC,AP2JEVSM,AP2JEREE,AP2JEAPE,         -
     AP2JEACE,AP2JETAE)
/*
//*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
//* JOB STATEMENT            ALL PARAMETERS
//* INPUT DD STATEMENT       TAPE UNIT TYPE, IF NECESSARY.
//* OUTPUT DD STATEMENT      DATA SET NAME AND CHARACTERISTICS.
```


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AP2JBALC

AP2JBALC allocates APL2 target and distribution libraries.

```
| //AP2JBALC JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
| //             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
| //*
| //*******************************************************************
| //* APL2 VERSION 2 RELEASE 2                                        *
| //* LICENSED MATERIALS - PROPERTY OF IBM                            *
| //* 5688-228 (C) COPYRIGHT IBM CORP. 1984, 1994.                   *
| //* SEE COPYRIGHT INSTRUCTIONS.                                     *
| //*******************************************************************
| //*
| //*******************************************************************
| //*   THIS JOB WILL ALLOCATE THE TARGET AND DISTRIBUTION LIBRARIES    *
| //*   FOR THE APL2 LICENSED PROGRAM.                                *
| //*******************************************************************
| //ALLOCBL EXEC PGM=IEFBR14
| //*******************************************************************
| //*
| //*    DISTRIBUTION LIBRARIES
| //*
| //*******************************************************************
| //*
| //AAP2MODS DD DSN=APL2.AAP2MODS,                MODULES
| //            DISP=(NEW,CATLG,DELETE),          DISTRIBUTION
| //            DCB=(RECFM=U,BLKSIZE=6144),       LIBRARY
| //*           DCB=SYS1.LINKLIB,
| //            SPACE=(6144,(750,25,75)),
| //            UNIT=SYSDA
| //*
| //AAP2MACS DD DSN=APL2.AAP2MACS,                     MACROS
| //            DISP=(NEW,CATLG,DELETE),              DISTRIBUTION
| //            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160), LIBRARY
| //*           DCB=SYS1.MACLIB,
| //            SPACE=(6160,(150,15,5)),
| //            UNIT=SYSDA
| //*
| //AAP2SRCL DD DSN=APL2.AAP2SRCL,                     SOURCE
| //            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160), DISTRIBUTION
| //            DISP=(NEW,CATLG,DELETE),              LIBRARY
| //            SPACE=(6160,(40,5,5)),
| //            UNIT=SYSDA
| //*
| //AAP2PROF DD DSN=APL2.AAP2PROF,                     PROFILE FILE
| //            DCB=(RECFM=VB,LRECL=255,BLKSIZE=7250), DISTRIBUTION
| //            DISP=(NEW,CATLG,DELETE),              LIBRARY
| //            SPACE=(7250,(10,5,5)),
| //            UNIT=SYSDA
| //*
| //AAP2NICK DD DSN=APL2.AAP2NICK,                     NAMES FILE
| //            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160), DISTRIBUTION
| //            DISP=(NEW,CATLG,DELETE),              LIBRARY
| //            SPACE=(6160,(25,5,10)),
| //            UNIT=SYSDA
| //*
```

```
| //AAP2SAMP DD DSN=APL2.AAP2SAMP,                      SAMPLE JCL
| //            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),  DISTRIBUTION
| //            DISP=(NEW,CATLG,DELETE),               LIBRARY
| //            SPACE=(6160,(65,10,5)),
| //            UNIT=SYSDA
| //*
| //AAP2LANG DD DSN=APL2.AAP2LANG,                      LANGUAGE FILE
| //            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),  DISTRIBUTION
| //            DISP=(NEW,CATLG,DELETE),               LIBRARY
| //            SPACE=(6160,(70,10,5)),
| //            UNIT=SYSDA
| //*
| //AAP2HELP DD DSN=APL2.AAP2HELP,                      HELP FILE
| //            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),  DISTRIBUTION
| //            DISP=(NEW,CATLG,DELETE),               LIBRARY
| //            SPACE=(6160,(600,60,5)),
| //            UNIT=SYSDA
| //*
| //AAP2FNTL DD DSN=APL2.AAP2FNTL,                      LINE-MODE FONTS
| //            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),  DISTRIBUTION
| //            DISP=(NEW,CATLG,DELETE),               LIBRARY
| //            SPACE=(6160,(2500,250,5)),
| //            UNIT=SYSDA
| //*
| //AAP2FNTP DD DSN=APL2.AAP2FNTP,                        3800 APA FONTS
| //            DCB=(RECFM=VBM,LRECL=8205,BLKSIZE=8209), DISTRIBUTION
| //            DISP=(NEW,CATLG,DELETE),                 LIBRARY
| //            SPACE=(8209,(85,10,5)),
| //            UNIT=SYSDA
| //*
| //AAP2FNT2 DD DSN=APL2.AAP2FNT2,                        3820 FONTS
| //            DCB=(RECFM=VBM,LRECL=8205,BLKSIZE=8209), DISTRIBUTION
| //            DISP=(NEW,CATLG,DELETE),                 LIBRARY
| //            SPACE=(8209,(65,10,5)),
| //            UNIT=SYSDA
| //*
| //AAP2WKSP DD DSN=APL2.AAP2WKSP,                      WORKSPACE
| //            DISP=(NEW,CATLG,DELETE),               DISTRIBUTION
| //            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),  LIBRARY
| //            SPACE=(6160,(400,40,5)),
| //            UNIT=SYSDA
| //*
| //AAP2SYMB DD DSN=APL2.AAP2SYMB,                      SYMBOL SET
| //            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),  DISTRIBUTION
| //            DISP=(NEW,CATLG,DELETE),               LIBRARY
| //            SPACE=(6160,(60,10,5)),
| //            UNIT=SYSDA
| //*
| //*********************************************************************
| //*
| //*    TARGET LIBRARIES
| //*
| //*********************************************************************
| //*
| //*SAP2LMDS DD DSN=APL2.SAP2LMDS,               EXECUTOR, ETC. MODULES
| //*            DISP=(NEW,CATLG,DELETE),         TARGET
| //*            DCB=(RECFM=U,BLKSIZE=6144),      LIBRARY
| //*            SPACE=(6144,(1200,40,10)),
```

```
//*            UNIT=SYSDA
//*
//*SAP2GSVP DD DSN=APL2.SAP2GSVP,                GLOBAL SVP MODULES
//*            DISP=(NEW,CATLG,DELETE),          TARGET
//*            DCB=(RECFM=U,BLKSIZE=6144),       LIBRARY
//*            SPACE=(6144,(20,1,5)),
//*            UNIT=SYSDA
//*
//*SAP2SYSH DD DSN=APL2.SAP2SYSH,                    TSO HELP DATA
//*            DISP=(NEW,CATLG,DELETE),              TARGET
//*            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160), LIBRARY
//*            SPACE=(6160,(5,1,1)),
//*            UNIT=SYSDA
//*
//SAP2SRCL DD DSN=APL2.SAP2SRCL,                    SOURCE
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160), TARGET
//            DISP=(NEW,CATLG,DELETE),              LIBRARY
//            SPACE=(6160,(40,5,5)),
//            UNIT=SYSDA
//*
//SAP2PROF DD DSN=APL2.SAP2PROF,                    PROFILE FILE
//            DCB=(RECFM=VB,LRECL=255,BLKSIZE=7250),TARGET
//            DISP=(NEW,CATLG,DELETE),              LIBRARY
//            SPACE=(7250,(5,5,5)),
//            UNIT=SYSDA
//*
//SAP2NICK DD DSN=APL2.SAP2NICK,                    NAMES FILE
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160), TARGET
//            DISP=(NEW,CATLG,DELETE),              LIBRARY
//            SPACE=(6160,(25,5,10)),
//            UNIT=SYSDA
//*
//SAP2LANG DD DSN=APL2.SAP2LANG,                    LANGUAGE FILE
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160), TARGET
//            DISP=(NEW,CATLG,DELETE),              LIBRARY
//            SPACE=(6160,(70,10,5)),
//            UNIT=SYSDA
//*
//SAP2HELP DD DSN=APL2.SAP2HELP,                    HELP FILE
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160), TARGET
//            DISP=(NEW,CATLG,DELETE),              LIBRARY
//            SPACE=(6160,(600,60,5)),
//            UNIT=SYSDA
//*
//SAP2FNTL DD DSN=APL2.SAP2FNTL,                      LINE-MODE FONTS
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),   TARGET
//            DISP=(NEW,CATLG,DELETE),                LIBRARY
//            SPACE=(6160,(2500,250,5)),
//            UNIT=SYSDA
//*
//*SAP2FNTP DD DSN=APL2.SAP2FNTP,                      3800 APA FONTS
//*            DCB=(RECFM=VBM,LRECL=8205,BLKSIZE=8209), TARGET
//*            DISP=(NEW,CATLG,DELETE),                 LIBRARY
//*            SPACE=(8209,(85,10,5)),
//*            UNIT=SYSDA
//*
//*SAP2FNT2 DD DSN=APL2.SAP2FNT2,                      3820 FONTS
//*            DCB=(RECFM=VBM,LRECL=8205,BLKSIZE=8209), TARGET
```

```
//*            DISP=(NEW,CATLG,DELETE),                 LIBRARY
//*            SPACE=(8209,(65,10,5)),
//*            UNIT=SYSDA
//*
//SAP2WKSP DD DSN=APL2.SAP2WKSP,                      WORKSPACE
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),  TARGET
//            DISP=(NEW,CATLG,DELETE),               LIBRARY
//            SPACE=(6160,(400,40,5)),
//            UNIT=SYSDA
//*
//*********************************************************************
//*    NOTE         GDDM REQUIRES THAT SYMBOL SET LIBRARIES HAVE A
//*                 BLOCK SIZE THAT IS A MULTIPLE OF 400
//*********************************************************************
//SAP2SYMB DD DSN=APL2.SAP2SYMB,                      SYMBOL SET
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=400),   TARGET
//            DISP=(NEW,CATLG,DELETE),               LIBRARY
//            SPACE=(400,(750,75,5)),
//            UNIT=SYSDA
//*
/*
//*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
//* JOB STATEMENT            ALL PARAMETERS
//* ALL DD STATEMENTS        DATA SET NAMES AND CHARACTERISTICS, IF
//*                          DESIRED. IF YOU CHANGE THE NAMES, CHANGE
//*                          THEM ALSO IN THE SET OF MEMBERS
//*                          AP2JBAPE, AP2JBACE, AP2JBND3, AP2JBNDR,
//*                          AP2JFONT, AP2JBTCH AND AP2JUSAP.
```

AP2JBSME

AP2JBSME allocates SMP Data Sets.

```
//AP2JBSME JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
//             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
//*
//*********************************************************************
//* APL2 VERSION 2 RELEASE 2                                          *
//* LICENSED MATERIALS - PROPERTY OF IBM                              *
//* 5688-228, 5688-229 (C) COPYRIGHT IBM CORP. 1984, 1994.            *
//* SEE COPYRIGHT INSTRUCTIONS.                                       *
//*********************************************************************
//*
//*********************************************************************
//*   THIS JOB WILL ALLOCATE THE REQUIRED SMP LIBRARIES FOR           *
//*   AN APL2 INSTALLATION WITH A SYSTEM RELEASE OF 'Z038'.           *
//*********************************************************************
//*
//*********************************************************************
//*   ALLOCATE THE CSI DATA SET                                       *
//*********************************************************************
//*
//ALLOC1  EXEC PGM=IDCAMS
//APLDASD  DD UNIT=SYSDA,VOL=SER=APLVOL,DISP=SHR
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
  DEFINE CLUSTER( NAME(APL2.SMPCSI.CSI)       -
                  FILE(APLDASD)               -
                  FREESPACE(10 5)             -
                  KEYS(24 0)                  -
                  RECORDSIZE(24 143)          -
                  SHAREOPTIONS(2 3)           -
                  UNIQUE                      -
                  VOLUMES(APLVOL)             -
                )                             -
          DATA   ( NAME(APL2.SMPCSI.DATA)     -
                   CYLINDERS(30 10)          -
                   CISZ(4096)                 -
                 )                            -
          INDEX  ( NAME(APL2.SMPCSI.INDEX)    -
                   CYLINDERS(5 3)             -
                   IMBED                      -
                 )                            -
          CATALOG(APLUCAT)
//*
//*
//*********************************************************************
//*   ALLOCATE THE REMAINING SMP LIBRARIES                            *
//*********************************************************************
//*
//ALLOC2  EXEC PGM=IEFBR14
//SMPLOG  DD  DSN=APL2.SMPLOG,
//            DCB=(RECFM=U,BLKSIZE=260),
//            DISP=(NEW,CATLG,DELETE),
//            SPACE=(260,(3000,100)),
//            UNIT=SYSDA
```

```
//*
//SMPMTS  DD  DSN=APL2.SMPMTS,
//            DCB=SYS1.MACLIB,
//            DISP=(NEW,CATLG,DELETE),
//            SPACE=(6160,(400,40,5)),
//            UNIT=SYSDA
//*
//SMPPTS  DD  DSN=APL2.SMPPTS,
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),
//            DISP=(NEW,CATLG,DELETE),
//            SPACE=(6160,(75,10,5)),
//            UNIT=SYSDA
//*
//SMPSCDS DD  DSN=APL2.SMPSCDS,
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),
//            DISP=(NEW,CATLG,DELETE),
//            SPACE=(6160,(100,10,50)),
//            UNIT=SYSDA
//*
//SMPSTS  DD  DSN=APL2.SMPSTS,
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),
//            DISP=(NEW,CATLG,DELETE),
//            SPACE=(6160,(80,10,5)),
//            UNIT=SYSDA
//*
//*
//*********************************************************************
//*    INITIALIZE THE CSI DATA SET                                    *
//*********************************************************************
//*
//SETUP1   EXEC PGM=IDCAMS
//SYSPRINT DD  SYSOUT=*
//SMPCSI   DD  DSN=APL2.SMPCSI.CSI,DISP=SHR
//ZPOOL    DD  DSN=SYS1.MACLIB(GIMZPOOL),DISP=SHR
//SYSIN    DD  *
  REPRO OUTFILE(SMPCSI) INFILE(ZPOOL)
//*
//SETUP2  EXEC AP2PSMPE
//SMPCNTL   DD *
SET BDY(GLOBAL).
UCLIN.
ADD   GLOBALZONE
           FMID(HLO1222,HLO1221)
           OPTIONS(APLOPT1)
           SREL(Z038)
           ZONEINDEX((APLTGT1,APL2.SMPCSI.CSI,TARGET),
                     (APLDLB1,APL2.SMPCSI.CSI,DLIB)).
ADD   OPTIONS(APLOPT1)
           DSSPACE(50,50,70)
           DSPREFIX(APL2).
ENDUCL.
SET BDY(APLTGT1).
UCLIN.
ADD   TARGETZONE(APLTGT1)
           OPTIONS(APLOPT1)
           RELATED(APLDLB1)
           SREL(Z038).
ENDUCL.
```

```
| SET BDY(APLDLB1).
| UCLIN.
| ADD   DLIBZONE(APLDLB1)
|           OPTIONS(APLOPT1)
|           RELATED(APLTGT1)
|           SREL(Z038).
| ENDUCL.
| /*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //*
| //* JES3 SYSTEMS - STEP ALLOC1 MUST BE COPIED INTO A SEPARATE JOB
| //*                TO BE RUN BEFORE THE ALLOC2, SETUP1 AND SETUP2
| //*                STEPS.
| //*
| //* JOB STATEMENT            ALL PARAMETERS
| //* DEFINE CLUSTER STATEMENT CLUSTER NAME, IF DESIRED. IF YOU CHANGE THE
| //*                          NAME, CHANGE IT ALSO IN THE MEMBER AP2PSMPE
| //*                          BEFORE COPYING IT TO SYS1.PROCLIB, IN THE
| //*                          SMPCSI DD STATEMENT BELOW, AND IN THE ADD
| //*                          GLOBALZONE STATEMENT BELOW.
| //* DEFINE CLUSTER STATEMENT VOLUME PARAMETER, USING THE VOLUME SERIAL
| //*                          USED IN THE APLDASD DD STATEMENT.
| //* DEFINE CLUSTER STATEMENT DATA COMPONENT NAME, IF DESIRED.
| //* DEFINE CLUSTER STATEMENT INDEX COMPONENT NAME, IF DESIRED.
| //* DEFINE CLUSTER STATEMENT USER CATALOG NAME, IF YOU CHANGED THE NAME
| //*                          IN THE DEFINE USERCATALOG STATEMENT. IF
| //*                          YOU ARE USING THE MASTER CATALOG, DELETE
| //*                          THE CATALOG PARAMETER.
| //* ALL DD STATEMENTS        DATA SET NAMES AND CHARACTERISTICS, IF
| //*                          DESIRED. IF YOU CHANGE THE NAMES, CHANGE
| //*                          THEM ALSO IN THE MEMBER AP2PSMPE BEFORE
| //*                          COPYING IT TO SYS1.PROCLIB AND IN MEMBER
| //*                          AP2JBAPE.
| //* SMPCSI DD STATEMENT      CLUSTER NAME, IF CHANGED IN THE DEFINE
| //*                          CLUSTER ABOVE.
| //* ZPOOL DD STATEMENT       DATA SET NAME, IF NECESSARY. THE MACRO
| //*                          LIBRARY CONTAINING THE SMP/E MACROS IS
| //*                          REQUIRED.
| //* ADD GLOBALZONE STMT      CSI CLUSTER NAME IN ZONEINDEX PARAMETER
| //*                          (TWICE), IF YOU CHANGED THE NAME IN THE
| //*                          DEFINE CLUSTER STATEMENT.
| //* ADD OPTIONS              DSPREFIX, IF DESIRED. THIS INDICATES THE
| //*                          HIGH-LEVEL QUALIFIER USED FOR THE
| //*                          TEMPORARY DATASETS USED BY RECEIVE.
```

AP2JBREE

AP2JBREE loads the APL2 Licensed Program into temporary data sets.

```
| //AP2JBREE JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
| //             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
| //*
| //*******************************************************************
| //* APL2 VERSION 2 RELEASE 2                                        *
| //* LICENSED MATERIALS - PROPERTY OF IBM                            *
| //* 5688-228 (C) COPYRIGHT IBM CORP. 1984, 1994.                   *
| //* SEE COPYRIGHT INSTRUCTIONS.                                     *
| //*******************************************************************
| //*
| //*******************************************************************
| //*   THIS JOB WILL RECEIVE THE APL2 LICENSED PROGRAM.              *
| //*******************************************************************
| //*
| //RECEIVE EXEC AP2PSMPE
| //SMPHOLD DD DUMMY
| //SMPPTFIN  DD DISP=SHR,DSN=SMPMCS,
| //     UNIT=3480,VOL=SER=LO1221,LABEL=(1,SL)
| //SMPCNTL   DD *
|      SET        BDY(GLOBAL).
|      RECEIVE    S (HLO1222 HLO1221).
| //*
| //*******************************************************************
| //*   THIS STEP WILL LIST THE SMP INFORMATION FROM THE CONTROL       *
| //*   DATA SET.                                                     *
| //*******************************************************************
| //*
| //LIST     EXEC AP2PSMPE
| //SMPCNTL   DD *
|      SET BDY(GLOBAL).
|      LIST LOG.
|      LIST GLOBALZONE SYSMOD.
|      LIST FORFMID(HLO1222, HLO1221).
| /*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //* JOB STATEMENT            ALL PARAMETERS
| //* SMPPTFIN DD STATEMENT    TAPE UNIT TYPE, IF NECESSARY.
| //*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //*             WHEN USING FOR RECEIVE OF PTF'S
| //* SMPPTFIN DD STATEMENT    POINT TO THE PTF LOCATION(S)
| //* RECEIVE  COMMAND         CHANGE FMID NUMBERS TO PTF NUMBER(S)
```

AP2JBAPE

AP2JBAPE applies any user modifications, link-edits the APL2 load modules, and loads APL2 run-time files into target libraries.

```
| //AP2JBAPE JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
| //             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
| //*
| //*******************************************************************
| //* APL2 VERSION 2 RELEASE 2                                        *
| //* LICENSED MATERIALS - PROPERTY OF IBM                            *
| //* 5688-228 (C) COPYRIGHT IBM CORP. 1984, 1994.                   *
| //* SEE COPYRIGHT INSTRUCTIONS.                                     *
| //*******************************************************************
| //*
| //*******************************************************************
| //*   THIS JOB WILL DO THE APPLY FOR THE APL2 LICENSED PROGRAM,     *
| //*   INCLUDING ANY OPTIONAL USERMOD(S). IF THERE ARE USERMODS,     *
| //*   THEN THE APPLY STATEMENT MUST BE EDITED TO INCLUDE THE        *
| //*   USERMOD IDS.                                                  *
| //*******************************************************************
| //*
| //APPLY    EXEC AP2PSMPE
| //*                        APL2 TARGET LIBRARIES
| //SAP2LMDS  DD DISP=OLD,DSN=SYS1.LINKLIB
| //SAP2GSVP  DD DISP=OLD,DSN=SYS1.LINKLIB
| //SAP2SYSH  DD DISP=OLD,DSN=SYS1.HELP
| //SAP2SRCL  DD DISP=OLD,DSN=APL2.SAP2SRCL
| //SAP2PROF  DD DISP=OLD,DSN=APL2.SAP2PROF
| //SAP2NICK  DD DISP=OLD,DSN=APL2.SAP2NICK
| //SAP2LANG  DD DISP=OLD,DSN=APL2.SAP2LANG
| //SAP2HELP  DD DISP=OLD,DSN=APL2.SAP2HELP
| //SAP2FNTL  DD DISP=OLD,DSN=APL2.SAP2FNTL
| //SAP2FNTP  DD DISP=OLD,DSN=SYS1.FONT38PP
| //SAP2FNT2  DD DISP=OLD,DSN=SYS1.FONT3820
| //SAP2WKSP  DD DISP=OLD,DSN=APL2.SAP2WKSP
| //SAP2SYMB  DD DISP=OLD,DSN=APL2.SAP2SYMB
| //*                        SYSLIB CONCATENATION
| //SYSLIB    DD DISP=SHR,DSN=APL2.SMPMTS
| //          DD DISP=SHR,DSN=APL2.AAP2MACS
| //          DD DISP=SHR,DSN=SYS1.MACLIB
| //SMPCNTL   DD *
|     SET        BDY(APLTGT1).
|     APPLY      S ( HLO1222 HLO1221
|                 /* XXXXXXX   /* DELETE FIRST '/*' IF USERMOD DESIRED */

|                 )
|                 COMPRESS(ALL)
|                 CHECK .
| /*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //* JOB STATEMENT            ALL PARAMETERS
| //* SAP2GSVP DD STATEMENT    DATA SET NAME, IF DESIRED. IF THE GLOBAL SV
| //*                          WILL NOT BE INSTALLED INTO SYS1.LINKLIB
| //*                          (THE DEFAULT), CHANGE THE NAME TO THE NAME
| //*                          OF THE TARGET LIBRARY USED.
| //* SAP2LMDS DD STATEMENT    DATA SET NAME, IF DESIRED. IF THE APL2 LOAD
```

```
| //*                          MODULES OTHER THAN THE GLOBAL SVP MODULES
| //*                          WILL NOT BE INSTALLED INTO SYS1.LINKLIB
| //*                          (THE DEFAULT), CHANGE THE NAME TO THE NAME
| //*                          OF THE TARGET LIBRARY USED.
| //* SAP2SYSH DD STATEMENT    DATA SET NAME, IF DESIRED. IF THE APL2 HELP
| //*                          DATA WILL NOT BE INSTALLED INTO SYS1.HELP
| //*                          (THE DEFAULT), CHANGE THE NAME TO THE NAME
| //*                          OF THE TARGET LIBRARY USED.
| //* SAP2FNTP DD STATEMENT    DATA SET NAME, IF DESIRED. IF THE APL2
| //*                          38PP FONTS WILL NOT BE INSTALLED INTO
| //*                          SYS1.FONT38PP (THE DEFAULT), CHANGE THE
| //*                          NAME TO THE NAME OF THE TARGET LIBRARY.
| //* SAP2FNT2 DD STATEMENT    DATA SET NAME, IF DESIRED. IF THE APL2
| //*                          3820 FONTS WILL NOT BE INSTALLED INTO
| //*                          SYS1.FONT3820 (THE DEFAULT), CHANGE THE
| //*                          NAME TO THE NAME OF THE TARGET LIBRARY.
| //* ALL OTHER DD STMTS       DATA SET NAMES, IF YOU CHANGED THEM IN THE
| //*                          AP2JBALC JOB.
| //* SET STATEMENT            TARGET ZONE NAME, IF YOU CHANGED IT IN THE
| //*                          AP2JBSME JOB.
| //* APPLY STATEMENT          USERMOD IDENTIFIER, IF A USERMOD IS TO BE
| //*                          APPLIED WITH THE PRODUCT.
| //* APPLY STATEMENT          CHECK PARAMETER, IF DESIRED. SEE THE
| //*                          INSTALLATION INSTRUCTIONS.
| //*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //*             WHEN USING FOR APPLY OF PTF'S
| //* APPLY    COMMAND         CHANGE FMID NUMBERS TO PTF NUMBER(S) OR
| //*                          REMOVE S (SOURCEID) CLAUSE TO APPLY ALL
```

AP2JBACE

AP2JBACE places the APL2 Licensed Program into the APL2 distribution libraries as permanent backup.

```
| //AP2JBACE JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
| //             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
| //*
| //*********************************************************************
| //* APL2 VERSION 2 RELEASE 2                                          *
| //* LICENSED MATERIALS - PROPERTY OF IBM                              *
| //* 5688-228 (C) COPYRIGHT IBM CORP. 1984, 1994.                      *
| //* SEE COPYRIGHT INSTRUCTIONS.                                       *
| //*********************************************************************
| //*
| //*********************************************************************
| //*   THIS JOB WILL DO THE ACCEPT FOR THE APL2 LICENSED PROGRAM,      *
| //*   INCLUDING ANY OPTIONAL USERMOD(S).  IF THERE ARE USERMODS,      *
| //*   THEN THE ACCEPT STATEMENT MUST BE EDITED TO INCLUDE THE         *
| //*   USERMOD IDS.                                                    *
| //*********************************************************************
| //*
| //ACCEPT   EXEC AP2PSMPE
| //*                        APL2 DISTRIBUTION LIBRARIES
| //AAP2MODS  DD DISP=OLD,DSN=APL2.AAP2MODS
| //AAP2MACS  DD DISP=OLD,DSN=APL2.AAP2MACS
| //AAP2SRCL  DD DISP=OLD,DSN=APL2.AAP2SRCL
| //AAP2PROF  DD DISP=OLD,DSN=APL2.AAP2PROF
| //AAP2NICK  DD DISP=OLD,DSN=APL2.AAP2NICK
| //AAP2SAMP  DD DISP=OLD,DSN=APL2.AAP2SAMP
| //AAP2LANG  DD DISP=OLD,DSN=APL2.AAP2LANG
| //AAP2HELP  DD DISP=OLD,DSN=APL2.AAP2HELP
| //AAP2FNTL  DD DISP=OLD,DSN=APL2.AAP2FNTL
| //AAP2FNTP  DD DISP=OLD,DSN=APL2.AAP2FNTP
| //AAP2FNT2  DD DISP=OLD,DSN=APL2.AAP2FNT2
| //AAP2WKSP  DD DISP=OLD,DSN=APL2.AAP2WKSP
| //AAP2SYMB  DD DISP=OLD,DSN=APL2.AAP2SYMB
| //*                        SYSLIB CONCATENATION
| //SYSLIB    DD DISP=SHR,DSN=APL2.SMPMTS
| //          DD DISP=SHR,DSN=APL2.AAP2MACS
| //          DD DISP=SHR,DSN=SYS1.MACLIB
| //SMPCNTL   DD *
|     SET        BDY(APLDLB1).
|     ACCEPT     S ( HLO1222 HLO1221
|                 /* XXXXXXX   /* DELETE FIRST '/*' IF USERMOD DESIRED */
|                  )
|                 /* USERMODS  /* DELETE FIRST '/*' IF USERMOD DESIRED */
|                  COMPRESS(ALL)
|                  CHECK .
| /*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //* JOB STATEMENT            ALL PARAMETERS
| //* ALL DD STMTS             DATA SET NAMES, IF YOU CHANGED THEM IN THE
| //*                          AP2JBALC.
| //* SET STATEMENT            DLIB ZONE NAME, IF YOU CHANGED IT IN THE
| //*                          AP2JBSME.
| //* ACCEPT STATEMENT         USERMOD IDENTIFIER, IF A USERMOD IS TO BE
```

```
| //*                          ACCEPTED WITH THE PRODUCT.
| //* ACCEPT STATEMENT         USERMODS PARAMETER, IF A USERMOD IS TO BE
| //*                          ACCEPTED WITH THE PRODUCT.
| //* ACCEPT STATEMENT         CHECK PARAMETER, IF DESIRED. SEE THE
| //*                          INSTALLATION INSTRUCTIONS.
| //*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //*             WHEN USING FOR ACCEPT OF PTF'S
| //* ACCEPT   COMMAND         CHANGE FMID NUMBERS TO PTF NUMBER(S) OR
| //*                          REMOVE S (SOURCEID) CLAUSE TO ACCEPT ALL
```

AP2JBVSM

AP2JBVSM allocates VSAM clusters for APL2 libraries.

```
| //AP2JBVSM JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
| //             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
| //*
| //*******************************************************************
| //* APL2 VERSION 2 RELEASE 2                                        *
| //* LICENSED MATERIALS - PROPERTY OF IBM                            *
| //* 5688-228 (C) COPYRIGHT IBM CORP. 1984, 1994.                   *
| //* SEE COPYRIGHT INSTRUCTIONS.                                     *
| //*******************************************************************
| //*
| //*******************************************************************
| //*   THIS JOB ALLOCATES VSAM CLUSTERS FOR APL2 AND ITS USERS.      *
| //*   AN INSTALLATION MAY USE ONE OR BOTH OF THE STEPS IN THIS JOB. *
| //*******************************************************************
| //*
| //*******************************************************************
| //*   STEP ONE ALLOCATES A FILE LIBRARY FOR A TSOUSER.              *
| //*                                                                 *
| //*   FILE LIBRARIES ARE USED FOR APL DATA FILES (FILES ACCESSED BY *
| //*   AP 121 AND PROCESSOR 12), THE SESSION MANAGER LOG, AND        *
| //*   WORKSPACES.                                                   *
| //*                                                                 *
| //*   NOTE: A VSAM CLUSTER IS REQUIRED FOR APL DATA FILES AND THE   *
| //*         SESSION MANAGER LOG.                                    *
| //*         SAM CAN BE USED AS AN ALTERNATIVE FOR WORKSPACES.       *
| //*         SEE THE APL2 FOR TSO INSTALLATION GUIDE FOR INFORMATION *
| //*         ON THE CHOICE OF VSAM OR SAM FOR WORKSPACE LIBRARIES.   *
| //*                                                                 *
| //*   THIS STEP CAN BE TAILORED AND REPEATED AS NECESSARY FOR       *
| //*   INDIVIDUAL APL2 USERS OR FOR CREATING LOCAL PUBLIC LIBRARY    *
| //*   FILES FOR YOUR INSTALLATION.                                  *
| //*******************************************************************
| //ALLOC1   EXEC PGM=IDCAMS
| //STEPCAT DD DSN=APLUCAT,DISP=OLD
| //SYSPRINT DD  SYSOUT=*
| //SYSIN    DD  *
|  DEF CLUSTER (NAME(USERID.TSOUSER.FILES)        -
|               VOL(APLVOL)                      -
|               CYLINDERS(2 1)                   -
|               SPEED                            -
|               SHR(2))                          -
|               INDEX(IMBED REPL)                -
|               DATA (KEYS(14 0) RECSZ(1048 4088) CISZ(4096)) -
|               CATALOG(APLUCAT)
|               /*                              */
| /*
| //*******************************************************************
| //*   STEP TWO ALLOCATES PUBLIC WORKSPACE LIBRARIES 1 AND 2         *
| //*   WHICH WILL CONTAIN THE IBM-SUPPLIED PUBLIC WORKSPACES.        *
| //*                                                                 *
| //*   THIS STEP SHOULD BE DONE ONLY ONCE FOR THE INSTALLATION.      *
| //*                                                                 *
| //*   NOTE: VSAM CLUSTERS ARE NOT REQUIRED FOR THE PUBLIC WORKSPACES. *
```

```
| //*         SAM MAY BE USED AS AN ALTERNATIVE.                       *
| //*         SEE THE APL2 FOR TSO INSTALLATION GUIDE FOR INFORMATION  *
| //*         ON THE CHOICE OF VSAM OR SAM FOR WORKSPACE LIBRARIES.    *
| //*******************************************************************
| //ALLOC2   EXEC PGM=IDCAMS
| //STEPCAT DD DSN=APLUCAT,DISP=OLD
| //SYSPRINT DD  SYSOUT=*
| //SYSIN    DD  *
|  DEF CLUSTER (NAME(APL2.LIB0001.PUBWKSPS)       -
|               VOL(APLVOL)                       -
|               SPEED                             -
|               SHR(2))                           -
|               INDEX(IMBED REPL)                 -
|               DATA (KEYS(14 0) RECSZ(1048 4088) REC(110 50) CISZ(4096)) -
|               CATALOG(APLUCAT)
|               /*                               */
|  DEF CLUSTER (NAME(APL2.LIB0002.PUBWKSPS)       -
|               VOL(APLVOL)                       -
|               SPEED                             -
|               SHR(2))                           -
|               INDEX(IMBED REPL)                 -
|               DATA (KEYS(14 0) RECSZ(1048 4088) REC(110 50) CISZ(4096)) -
|               CATALOG(APLUCAT)
|               /*                               */
| /*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //* JOB STATEMENT            ALL PARAMETERS
| //* STEPCAT DD STATEMENT(S)  THE NAME OF THE VSAM USER CATALOG DEFINED
| //*                          IN THE AP2JBSME JOB. IF USING THE MASTER
| //*                          CATALOG, DELETE THIS DD STATEMENT.
| //* DEFINE CLUSTER STMT(S)   THE NAME OF THE CLUSTER(S), ACCORDING TO
| //*                          THE NAMING CONVENTION IN THE USER'S
| //*                          ENVIRONMENT, IN THE NAME PARAMETER
| //* DEFINE CLUSTER STMT(S)   THE VOLUME SERIAL NUMBER IN THE VOLUME
| //*                          PARAMETER
| //* DEFINE CLUSTER STMT(S)   THE ALLOCATION FOR THE CLUSTER(S), APPROP-
| //*                          RIATE TO THE ANTICIPATED SIZE OF THE
| //*                          LIBRARY(S), IN THE CYLINDERS OR RECORDS
| //*                          PARAMETER
| //* DEFINE CLUSTER STMT(S)   THE NAME OF THE VSAM USER CATALOG DEFINED
| //*                          IN THE AP2JBSME JOB AND REFERENCED IN
| //*                          THE STEPCAT DD STATEMENT. IF USING THE
| //*                          MASTER CATALOG, DELETE THE CATALOG
| //*                          PARAMETER.
```

AP2JBTCH

AP2JBTCH builds the APL2 public workspaces.

```
//AP2JBTCH JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(2),
//             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
//*
//*********************************************************************
//* APL2 VERSION 2 RELEASE 2                                          *
//* LICENSED MATERIALS - PROPERTY OF IBM                              *
//* 5668-899 (C) COPYRIGHT IBM CORP. 1987, 1994.                      *
//* SEE COPYRIGHT INSTRUCTIONS.                                       *
//*********************************************************************
//*
//*********************************************************************
//*   EXECUTE THIS JOB TO BUILD THE APL2 PUBLIC WORKSPACES.           *
//*********************************************************************
//*
//APL2 EXEC PGM=IKJEFT01,DYNAMNBR=50,REGION=4096K
//STEPLIB DD DISP=SHR,DSN=SYS1.LINKLIB
//SYSPROC DD DISP=SHR,DSN=USERID.CLIST.CLIST
//SYSTSPRT DD SYSOUT=*
//APLPRINT DD SYSOUT=*,
//             DCB=(RECFM=VBA,LRECL=137,BLKSIZE=3509)
//*FOR VSAM LIBRARIES, REPLACE THE "FREE FI(W1)" AND "FREE FI(W2)"
//*WITH ALLOCATIONS AS FOLLOWS:
//*ALLOC FI(W1)     DA('APL2.LIB0001.PUBWKSPS')
//*ALLOC FI(W2)     DA('APL2.LIB0002.PUBWKSPS')
//SYSTSIN DD *
FREE  FI(W1)
FREE  FI(W2)
%APL2 SM(OFF) WSS(600K) SHR(60K) FRE(256K) AISIZE(10K) DE(35)
LOGOFF
/*
//APLIN DD *
)CLEAR
)IN 'APL2.SAP2WKSP(APLDATA)'
)WSID 2 APLDATA
)SAVE
)CLEAR
)COPY 2 APLDATA
)WSID 2 APLDATA
)SAVE
)CLEAR
)IN 'APL2.SAP2WKSP(CHARTX)'
)WSID 2 CHARTX
)SAVE
)CLEAR
)COPY 2 CHARTX
)WSID 2 CHARTX
)SAVE
)CLEAR
)IN 'APL2.SAP2WKSP(DISPLAY)'
)WSID 1 DISPLAY
)SAVE
)CLEAR
)COPY 1 DISPLAY
```

```
| )WSID 1 DISPLAY
| )SAVE
| )CLEAR
| )IN 'APL2.SAP2WKSP(EXAMPLES)'
| )WSID 1 EXAMPLES
| )SAVE
| )CLEAR
| )COPY 1 EXAMPLES
| )WSID 1 EXAMPLES
| )SAVE
| )CLEAR
| )IN 'APL2.SAP2WKSP(FILESERV)'
| )WSID 2 FILESERV
| )SAVE
| )CLEAR
| )COPY 2 FILESERV
| )WSID 2 FILESERV
| )SAVE
| )CLEAR
| )IN 'APL2.SAP2WKSP(FSC126)'
| )WSID 2 FSC126
| )SAVE
| )CLEAR
| )COPY 2 FSC126
| )WSID 2 FSC126
| )SAVE
| )CLEAR
| )IN 'APL2.SAP2WKSP(FSM)'
| )WSID 2 FSM
| )SAVE
| )CLEAR
| )COPY 2 FSM
| )WSID 2 FSM
| )SAVE
| )CLEAR
| )IN 'APL2.SAP2WKSP(GDMX)'
| )WSID 2 GDMX
| )SAVE
| )CLEAR
| )COPY 2 GDMX
| )WSID 2 GDMX
| )SAVE
| )CLEAR
| )IN 'APL2.SAP2WKSP(GRAPHPAK)'
| )WSID 2 GRAPHPAK
| )SAVE
| )CLEAR
| )COPY 2 GRAPHPAK
| )WSID 2 GRAPHPAK
| )SAVE
| )CLEAR
| )IN 'APL2.SAP2WKSP(MATHFNS)'
| )WSID 1 MATHFNS
| )SAVE
| )CLEAR
| )COPY 1 MATHFNS
| )WSID 1 MATHFNS
| )SAVE
```

```
|  )CLEAR
|  )IN 'APL2.SAP2WKSP(MEDIT)'
|  )WSID 1 MEDIT
|  )SAVE
|  )CLEAR
|  )COPY 1 MEDIT
|  )WSID 1 MEDIT
|  )SAVE
|  )CLEAR
|  )IN 'APL2.SAP2WKSP(PRINTWS)'
|  )WSID 2 PRINTWS
|  )SAVE
|  )CLEAR
|  )COPY 2 PRINTWS
|  )WSID 2 PRINTWS
|  )SAVE
|  )CLEAR
|  )IN 'APL2.SAP2WKSP(SQL)'
|  )WSID 2 SQL
|  )SAVE
|  )CLEAR
|  )COPY 2 SQL
|  )WSID 2 SQL
|  )SAVE
|  )CLEAR
|  )IN 'APL2.SAP2WKSP(SUPPLIED)'
|  )WSID 1 SUPPLIED
|  )SAVE
|  )CLEAR
|  )COPY 1 SUPPLIED
|  )WSID 1 SUPPLIED
|  )SAVE
|  )CLEAR
|  )IN 'APL2.SAP2WKSP(TRANSFER)'
|  )WSID 2 TRANSFER
|  )SAVE
|  )CLEAR
|  )COPY 2 TRANSFER
|  )WSID 2 TRANSFER
|  )SAVE
|  )CLEAR
|  )IN 'APL2.SAP2WKSP(TSO)'
|  )WSID 2 TSO
|  )SAVE
|  )CLEAR
|  )COPY 2 TSO
|  )WSID 2 TSO
|  )SAVE
|  )CLEAR
|  )IN 'APL2.SAP2WKSP(UTILITY)'
|  )WSID 1 UTILITY
|  )SAVE
|  )CLEAR
|  )COPY 1 UTILITY
|  )WSID 1 UTILITY
|  )SAVE
|  )CLEAR
|  )IN 'APL2.SAP2WKSP(VAPLFILE)'
```

```
|  )WSID 2 VAPLFILE
|  )SAVE
|  )CLEAR
|  )COPY 2 VAPLFILE
|  )WSID 2 VAPLFILE
|  )SAVE
|  )CLEAR
|  )IN 'APL2.SAP2WKSP(VSAMDATA)'
|  )WSID 2 VSAMDATA
|  )SAVE
|  )CLEAR
|  )COPY 2 VSAMDATA
|  )WSID 2 VSAMDATA
|  )SAVE
|  )CLEAR
|  )IN 'APL2.SAP2WKSP(WSINFO)'
|  )WSID 1 WSINFO
|  )SAVE
|  )CLEAR
|  )COPY 1 WSINFO
|  )WSID 1 WSINFO
|  )SAVE
|  )OFF
|  /*
|  //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
|  //* JOB STATEMENT            ALL PARAMETERS
|  //* STEPLIB DD STATEMENT     DATA SET NAME, IF NECESSARY
|  //* SYSPROC DD STATEMENT     HIGH-LEVEL QUALIFIER
|  //* ALLOC W1      VSAM ONLY  THE NAME OF THE VSAM LIBRARY 1 CLUSTER
|  //*                          DEFINED IN THE AP2JBVSM JOB
|  //* FREE  W1       SAM ONLY  ENSURES THAT LIBRARY 1 IS NON-VSAM
|  //*                          MUST BE DELETED IF USING VSAM LIBRARY
|  //* ALLOC W2      VSAM ONLY  THE NAME OF THE VSAM LIBRARY 2 CLUSTER
|  //*                          DEFINED IN THE AP2JBVSM JOB
|  //* FREE  W2       SAM ONLY  ENSURES THAT LIBRARY 2 IS NON-VSAM
|  //*                          MUST BE DELETED IF USING VSAM LIBRARY
|  //* )IN STATEMENTS           DATA SET NAMES, IF YOU CHANGED THE NAME OF
|  //*                          THE TARGET LIBRARY FOR WORKSPACES IN THE
|  //*                          AP2JBALC JOB.
|  //* )WSID STATEMENTS         PUBLIC LIBRARY NUMBER, IF DESIRED; IF
|  //*                          NECESSARY, THE APPROPRIATE PASSWORD MAY
|  //*                          BE ADDED FOLLOWING THE WORKSPACE NAME, AS
|  //*                          'WSNAME:PASSWORD'
|  //* APL2 INVOCATION          NAME PARAMETER TO THE SAME USED IN CLIST
```

AP2JPROF

AP2JPROF creates the session manager default profile.

```
| //AP2JPROF   JOB  (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
| //           NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
| //*
| //*******************************************************************
| //* APL2 VERSION 2 RELEASE 2                                        *
| //* LICENSED MATERIAL - PROPERTY OF IBM                             *
| //* 5688-228 (C) COPYRIGHT IBM CORP. 1984, 1994.                    *
| //* SEE COPYRIGHT INSTRUCTIONS                                      *
| //*******************************************************************
| //*
| //*******************************************************************
| //*    EXECUTE THIS JOB TO COPY THE APL2 SESSION MANAGER            *
| //*    DEFAULT PROFILE INTO A SEQUENTIAL DATA SET.                  *
| //*******************************************************************
| //*
| //APL2PR  PROC V=,U=,PUBQLFR=
| //COPY    EXEC PGM=IEBGENER
| //SYSIN    DD  DUMMY
| //SYSPRINT DD  SYSOUT=*
| //SYSUT1   DD  DSN=APL2.SAP2PROF(AP2SMDEF),DISP=OLD
| //SYSUT2   DD  DSN=&PUBQLFR..DEFAULT.VSAPLPR,DISP=(,CATLG),
| //             SPACE=(TRK,(1,1)),
| //             DCB=(RECFM=VB,LRECL=255,BLKSIZE=4096),
| //             UNIT=&U,VOL=SER=&V
| //         PEND
| //* ------------------------------------------------------------------
| //* MODIFY THE SYMBOLIC OPERANDS 'V' AND 'U' FOR THE TARGET VOLUME
| //* WHICH WILL CONTAIN THE DEFAULT PROFILE
| //*     (PROBABLY SHOULD BE THE SAME AS PUBLIC WORKSPACES).
| //* 'PUBQLFR' IS THE WORKSPACE DATA SET HIGH-LEVEL QUALIFER.
| //* ------------------------------------------------------------------
| //S1     EXEC APL2PR,
| //            V=VVVVVV,          RECEIVING VOLUME FOR DEFAULT PROFILE
| //            U=UUUU,            RECEIVING UNIT   FOR DEFAULT PROFILE
| //            PUBQLFR=AP2V2R02   PUBLIC WORKSPACE DATA SET QUALIFIER
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //* JOB STATEMENT            ALL PARAMETERS
| //* S1 EXEC STATEMENT        THE VOLUME SERIAL NUMBER IN THE V PARAMETER
| //* S1 EXEC STATEMENT        THE UNIT TYPE IN THE U PARAMETER FOR THE
| //*                          VOLUME SPECIFIED IN THE V PARAMETER.
| //* S1 EXEC STATEMENT        THE HIGH-LEVEL QUALIFIER IN THE PUBQLFR
| //*                          PARAMETER.
```

AP2JUOPT

AP2JUOPT link-edits the VS APL options module.

```
| //AP2JUOPT JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
| //             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
| //*
| //*********************************************************************
| //* APL2 VERSION 2 RELEASE 2                                          *
| //* LICENSED MATERIAL - PROPERTY OF IBM                               *
| //* 5688-228 (C) COPYRIGHT IBM CORP. 1984, 1994.                     *
| //* SEE COPYRIGHT INSTRUCTIONS                                       *
| //*********************************************************************
| //*
| //*********************************************************************
| //*    EXECUTE THIS JOB TO BUILD THE LOAD MODULE FOR THE VS APL       *
| //*    OPTIONS MODULE                                                 *
| //*********************************************************************
| //*
| //OPTLKED  EXEC PGM=IEWL,REGION=2048K,
| //          PARM='NCAL,RENT,MAP,LIST,LET,REUS,SIZE=(250K,26060)'
| //SYSPRINT DD SYSOUT=*
| //UOPTLIB  DD DSN=VSAPL.APLMODS,DISP=SHR
| //SYSLMOD  DD DSN=SYS1.LINKLIB,DISP=OLD
| //SYSUT1   DD UNIT=SYSDA,SPACE=(13030,(40,20))
| //SYSLIN   DD *
|    INCLUDE UOPTLIB(APLYUOPT)
|    NAME APLYUOPT(R)
| /*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //* JOB STATEMENT            ALL PARAMETERS
| //* UOPTLIB DD STMT          DATA SET NAME, IF NECESSARY. THE NAME OF TH
| //*                          DISTRIBUTION LIBRARY FOR VS APL MODULES IS
| //*                          REQUIRED.
| //* SYSLMOD DD STATEMENT     DATA SET NAME, IF NECESSARY. IF APL2 IS NOT
| //*                          TO BE INSTALLED INTO SYS1.LINKLIB (THE
| //*                          DEFAULT), SPECIFY THE NAME OF THE TARGET
| //*                          LIBRARY TO BE USED.
```

AP2JUSAP

AP2JUSAP link-edits a user-written auxiliary processor.

```
//AP2JUSAP JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
//             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
//*
//*********************************************************************
//* APL2 VERSION 2 RELEASE 2                                          *
//* LICENSED MATERIAL - PROPERTY OF IBM                               *
//* 5688-228 (C) COPYRIGHT IBM CORP. 1984, 1994.                      *
//* SEE COPYRIGHT INSTRUCTIONS                                        *
//*********************************************************************
//*
//*********************************************************************
//*    EXECUTE THIS JOB TO LINKEDIT A USER-WRITTEN LOCAL AUXILIARY    *
//*    PROCESSOR.                                                     *
//*********************************************************************
//*
//APLKED   EXEC PGM=IEWL,REGION=2048K,
//          PARM='NCAL,RENT,MAP,LIST,LET,REUS,SIZE=(250K,26060)'
//SYSPRINT DD SYSOUT=*
//APLIB    DD DSN=USERID.USERAP.LIB,DISP=SHR
//MODLIB   DD DSN=APL2.AAP2MODS,DISP=SHR
//SYSLMOD  DD DSN=SYS1.LINKLIB,DISP=OLD
//SYSLIN   DD *
  CHANGE APENTRY(USAPNAME)
  INCLUDE MODLIB(AP2TASVP)
  INCLUDE APLIB(USERAP)
  ENTRY AP2TASVP
  NAME AP999(R)
/*
//*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
//* JOB STATEMENT            ALL PARAMETERS
//* APLIB DD STMT            DATA SET NAME. THE NAME OF THE DATA SET
//*                          CONTAINING THE USER-WRITTEN AUXILIARY
//*                          PROCESSOR IS REQUIRED.
//* MODLIB DD STMT           DATA SET NAME, IF YOU CHANGED THE NAME OF
//*                          THE DISTRIBUTION LIBRARY FOR MODULES IN THE
//*                          AP2JBALC JOB.  THIS STATEMENT IS ONLY
//*                          REQUIRED IF THE PROCESSOR IS WRITTEN TO USE
//*                          THE VS APL INTERFACE.
//* SYSLMOD DD STATEMENT     DATA SET NAME, IF NECESSARY. IF APL2 IS NOT
//*                          TO BE INSTALLED INTO SYS1.LINKLIB (THE
//*                          DEFAULT), SPECIFY THE NAME OF THE TARGET
//*                          LIBRARY TO BE USED.
//* CHANGE STATEMENT         SUBSTITUTE THE NAME OF THE ENTRY POINT OF
//*                          THE USER-WRITTEN VSAPL AUXILIARY
//*                          PROCESSOR FOR THE SYMBOL 'USAPNAME'.
//*                          DELETE THIS STATEMENT FOR PROCESSORS
//*                          WHICH USE THE APL2 PROCESSOR INTERFACE.
//* INCLUDE APLIB DD STMT    SUBSTITUTE THE NAME OF THE USER-WRITTEN
//*                          AUXILIARY PROCESSOR MODULE FOR THE SYMBOL
//*                          'USERAP'.
//* ENTRY AP2TASVP           LEAVE THIS AS IS FOR VS APL INTERFACE
//*                          PROCESSORS.  SUBSTITUTE THE NAME OF THE
//*                          USER-WRITTEN AUXILIARY PROCESSOR FOR APL2
```

```
| //*                          INTERFACE PROCESSORS.
| //* NAME STATEMENT           SUBSTITUTE THE NAME OF THE USER-WRITTEN
| //*                          AUXILIARY PROCESSOR FOR THE SYMBOL 'AP999'.
```

Sample JCL Statements for APL2 Application Environment

The following sample JCL statements are specific to APL2 application environment.

AP2JETAE

AP2JETAE copies sample JCL from the APL2 distribution tape.

```
| //AP2JETAE JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
| //             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
| //*
| //*********************************************************************
| //* APL2 VERSION 2 RELEASE 2                                          *
| //* LICENSED MATERIALS - PROPERTY OF IBM                              *
| //* 5688-229 (C) COPYRIGHT IBM CORP. 1987, 1994.                      *
| //* SEE COPYRIGHT INSTRUCTIONS.                                       *
| //*********************************************************************
| //*
| //*******************************************************************
| //*  THIS JOB USES IEBCOPY TO RETRIEVE THE NECESSARY SMP/E SAMPLE    *
| //*  JOBS FROM THE DISTRIBUTION TAPE FOR APPLICATION ENVIRONMENT.    *
| //*******************************************************************
| //*
| //RETRIEVE EXEC PGM=IEBCOPY
| //SYSPRINT DD SYSOUT=*
| //INPUT    DD UNIT=3480,DISP=OLD,
| //            LABEL=(8,SL),DSN=HLO1222.F7,
| //            VOL=SER=LO1222
| //OUTPUT   DD DSN=USERID.APL2INST.JCL,DISP=(,CATLG),
| //            UNIT=SYSDA,SPACE=(6160,(65,10,5)),
| //            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160)
| //SYSUT3   DD UNIT=SYSDA,SPACE=(TRK,(5,1))
| //SYSUT4   DD UNIT=SYSDA,SPACE=(TRK,(5,1))
| //SYSIN    DD *
|   COPY INDD=INPUT,OUTDD=OUTPUT
|   EXCLUDE MEMBER=(AP2JBSME,AP2JBALC,AP2JBVSM,AP2JBREE,AP2JBAPE,         -
|      AP2JPROF,AP2JBTCH,AP2JUOPT,AP2JBACE,AP2JBTAE,AP2JUSAP,             -
|      AP2CLSTV,AP2CLSTS)
| /*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //* JOB STATEMENT            ALL PARAMETERS
| //* INPUT DD STATEMENT       TAPE UNIT TYPE, IF NECESSARY.
| //* OUTPUT DD STATEMENT      DATA SET NAME AND CHARACTERISTICS.
```

AP2JEALC

AP2JEALC allocates APL2 target and distribution libraries.

```
| //AP2JEALC JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
| //             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
| //*
| //*******************************************************************
| //* APL2 VERSION 2 RELEASE 2                                        *
| //* LICENSED MATERIALS - PROPERTY OF IBM                            *
| //* 5688-229 (C) COPYRIGHT IBM CORP. 1987, 1994.                    *
| //* SEE COPYRIGHT INSTRUCTIONS.                                     *
| //*******************************************************************
| //*
| //*******************************************************************
| //*   THIS JOB WILL ALLOCATE THE TARGET AND DISTRIBUTION LIBRARIES    *
| //*   FOR THE APL2 APPLICATION ENVIRONMENT LICENSED PROGRAM.          *
| //*******************************************************************
| //ALLOCBL EXEC PGM=IEFBR14
| //*******************************************************************
| //*
| //*    DISTRIBUTION LIBRARIES
| //*
| //*******************************************************************
| //*
| //AAP2MODS DD DSN=APL2.AAP2MODS,                MODULES
| //            DISP=(NEW,CATLG,DELETE),          DISTRIBUTION
| //            DCB=(RECFM=U,BLKSIZE=6144),       LIBRARY
| //*           DCB=SYS1.LINKLIB,
| //            SPACE=(6144,(750,25,75)),
| //            UNIT=SYSDA
| //*
| //AAP2MACS DD DSN=APL2.AAP2MACS,                    MACROS
| //            DISP=(NEW,CATLG,DELETE),              DISTRIBUTION
| //            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160), LIBRARY
| //*           DCB=SYS1.MACLIB,
| //            SPACE=(6160,(150,15,5)),
| //            UNIT=SYSDA
| //*
| //AAP2SRCL DD DSN=APL2.AAP2SRCL,                    SOURCE
| //            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160), DISTRIBUTION
| //            DISP=(NEW,CATLG,DELETE),              LIBRARY
| //            SPACE=(6160,(40,5,5)),
| //            UNIT=SYSDA
| //*
| //AAP2PROF DD DSN=APL2.AAP2PROF,                    PROFILE FILE
| //            DCB=(RECFM=VB,LRECL=255,BLKSIZE=7250), DISTRIBUTION
| //            DISP=(NEW,CATLG,DELETE),              LIBRARY
| //            SPACE=(7250,(10,5,5)),
| //            UNIT=SYSDA
| //*
| //AAP2NICK DD DSN=APL2.AAP2NICK,                    NAMES FILE
| //            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160), DISTRIBUTION
| //            DISP=(NEW,CATLG,DELETE),              LIBRARY
| //            SPACE=(6160,(25,5,10)),
| //            UNIT=SYSDA
| //*
```

```
| //AAP2SAMP DD DSN=APL2.AAP2SAMP,                      SAMPLE JCL
| //           DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),  DISTRIBUTION
| //           DISP=(NEW,CATLG,DELETE),               LIBRARY
| //           SPACE=(6160,(65,10,5)),
| //           UNIT=SYSDA
| //*
| //AAP2LANG DD DSN=APL2.AAP2LANG,                     LANGUAGE FILE
| //           DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),  DISTRIBUTION
| //           DISP=(NEW,CATLG,DELETE),               LIBRARY
| //           SPACE=(6160,(70,10,5)),
| //           UNIT=SYSDA
| //*
| //AAP2HELP DD DSN=APL2.AAP2HELP,                     HELP FILE
| //           DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),  DISTRIBUTION
| //           DISP=(NEW,CATLG,DELETE),               LIBRARY
| //           SPACE=(6160,(600,60,5)),
| //           UNIT=SYSDA
| //*
| //AAP2FNTL DD DSN=APL2.AAP2FNTL,                     LINE-MODE FONTS
| //           DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),  DISTRIBUTION
| //           DISP=(NEW,CATLG,DELETE),               LIBRARY
| //           SPACE=(6160,(2500,250,5)),
| //           UNIT=SYSDA
| //*
| //AAP2FNTP DD DSN=APL2.AAP2FNTP,                       3800 APA FONTS
| //           DCB=(RECFM=VBM,LRECL=8205,BLKSIZE=8209), DISTRIBUTION
| //           DISP=(NEW,CATLG,DELETE),                 LIBRARY
| //           SPACE=(8209,(85,10,5)),
| //           UNIT=SYSDA
| //*
| //AAP2FNT2 DD DSN=APL2.AAP2FNT2,                       3820 FONTS
| //           DCB=(RECFM=VBM,LRECL=8205,BLKSIZE=8209), DISTRIBUTION
| //           DISP=(NEW,CATLG,DELETE),                 LIBRARY
| //           SPACE=(8209,(65,10,5)),
| //           UNIT=SYSDA
| //*
| //*********************************************************************
| //*
| //*    TARGET LIBRARIES
| //*
| //*********************************************************************
| //*
| //*SAP2LMDS DD DSN=APL2.SAP2LMDS,               EXECUTOR, ETC. MODULES
| //*           DISP=(NEW,CATLG,DELETE),          TARGET
| //*           DCB=(RECFM=U,BLKSIZE=6144),       LIBRARY
| //*           SPACE=(6144,(800,25,10)),
| //*           UNIT=SYSDA
| //*
| //*SAP2GSVP DD DSN=APL2.SAP2GSVP,               GLOBAL SVP MODULES
| //*           DISP=(NEW,CATLG,DELETE),          TARGET
| //*           DCB=(RECFM=U,BLKSIZE=6144),       LIBRARY
| //*           SPACE=(6144,(20,1,5)),
| //*           UNIT=SYSDA
| //*
| //*SAP2SYSH DD DSN=APL2.SAP2SYSH,                  TSO HELP DATA
| //*           DISP=(NEW,CATLG,DELETE),            TARGET
| //*           DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),  LIBRARY
| //*           SPACE=(6160,(5,1,1)),
```

```
//*            UNIT=SYSDA
//*
//SAP2SRCL DD DSN=APL2.SAP2SRCL,                      SOURCE
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),  TARGET
//            DISP=(NEW,CATLG,DELETE),               LIBRARY
//            SPACE=(6160,(40,5,5)),
//            UNIT=SYSDA
//*
//SAP2PROF DD DSN=APL2.SAP2PROF,                      PROFILE FILE
//            DCB=(RECFM=VB,LRECL=255,BLKSIZE=7250), TARGET
//            DISP=(NEW,CATLG,DELETE),               LIBRARY
//            SPACE=(7250,(5,5,5)),
//            UNIT=SYSDA
//*
//SAP2NICK DD DSN=APL2.SAP2NICK,                      NAMES FILE
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),  TARGET
//            DISP=(NEW,CATLG,DELETE),               LIBRARY
//            SPACE=(6160,(25,5,10)),
//            UNIT=SYSDA
//*
//SAP2LANG DD DSN=APL2.SAP2LANG,                      LANGUAGE FILE
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),  TARGET
//            DISP=(NEW,CATLG,DELETE),               LIBRARY
//            SPACE=(6160,(70,10,5)),
//            UNIT=SYSDA
//*
//SAP2HELP DD DSN=APL2.SAP2HELP,                      HELP FILE
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),  TARGET
//            DISP=(NEW,CATLG,DELETE),               LIBRARY
//            SPACE=(6160,(600,60,5)),
//            UNIT=SYSDA
//*
//SAP2FNTL DD DSN=APL2.SAP2FNTL,                        LINE-MODE FONTS
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),     TARGET
//            DISP=(NEW,CATLG,DELETE),                  LIBRARY
//            SPACE=(6160,(2500,250,5)),
//            UNIT=SYSDA
//*
//*SAP2FNTP DD DSN=APL2.SAP2FNTP,                        3800 APA FONTS
//*            DCB=(RECFM=VBM,LRECL=8205,BLKSIZE=8209), TARGET
//*            DISP=(NEW,CATLG,DELETE),                  LIBRARY
//*            SPACE=(8209,(85,10,5)),
//*            UNIT=SYSDA
//*
//*SAP2FNT2 DD DSN=APL2.SAP2FNT2,                        3820 FONTS
//*            DCB=(RECFM=VBM,LRECL=8205,BLKSIZE=8209), TARGET
//*            DISP=(NEW,CATLG,DELETE),                  LIBRARY
//*            SPACE=(8209,(65,10,5)),
//*            UNIT=SYSDA
//*
/*
//*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
//* JOB STATEMENT            ALL PARAMETERS
//* ALL DD STATEMENTS        DATA SET NAMES AND CHARACTERISTICS, IF
//*                          DESIRED. IF YOU CHANGE THE NAMES, CHANGE
//*                          THEM ALSO IN THE SET OF MEMBERS
//*                          AP2JEAPE, AP2JEACE, AP2JBND3, AP2JBNDR,
//*                          AND AP2JFONT.
```

AP2JESME

AP2JESME allocates SMP Data Sets.

```
//AP2JESME JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
//             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
//*
//*********************************************************************
//* APL2 VERSION 2 RELEASE 2                                          *
//* LICENSED MATERIALS - PROPERTY OF IBM                              *
//* 5688-229 (C) COPYRIGHT IBM CORP. 1987, 1994.                      *
//* SEE COPYRIGHT INSTRUCTIONS.                                       *
//*********************************************************************
//*
//*********************************************************************
//*   THIS JOB WILL ALLOCATE THE REQUIRED SMP LIBRARIES FOR           *
//*   AN APL2 AE INSTALLATION WITH A SYSTEM RELEASE OF 'Z038'.        *
//*********************************************************************
//*
//*********************************************************************
//*   ALLOCATE THE CSI DATA SET                                       *
//*********************************************************************
//*
//ALLOC1  EXEC PGM=IDCAMS
//APLDASD  DD UNIT=SYSDA,VOL=SER=APLVOL,DISP=SHR
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
  DEFINE CLUSTER( NAME(APL2.SMPCSI.CSI)       -
                  FILE(APLDASD)               -
                  FREESPACE(10 5)             -
                  KEYS(24 0)                  -
                  RECORDSIZE(24 143)          -
                  SHAREOPTIONS(2 3)           -
                  UNIQUE                      -
                  VOLUMES(APLVOL)             -
                )                             -
          DATA   ( NAME(APL2.SMPCSI.DATA)     -
                   CYLINDERS(30 10)          -
                   CISZ(4096)                 -
                 )                            -
          INDEX  ( NAME(APL2.SMPCSI.INDEX)    -
                   CYLINDERS(5 3)             -
                   IMBED                      -
                 )                            -
          CATALOG(APLUCAT)
//*
//*
//*********************************************************************
//*   ALLOCATE THE REMAINING SMP LIBRARIES                            *
//*********************************************************************
//*
//ALLOC2  EXEC PGM=IEFBR14
//SMPLOG  DD  DSN=APL2.SMPLOG,
//            DCB=(RECFM=U,BLKSIZE=260),
//            DISP=(NEW,CATLG,DELETE),
//            SPACE=(260,(3000,100)),
//            UNIT=SYSDA
```

```
//*
//SMPMTS  DD  DSN=APL2.SMPMTS,
//            DCB=SYS1.MACLIB,
//            DISP=(NEW,CATLG,DELETE),
//            SPACE=(6160,(400,40,5)),
//            UNIT=SYSDA
//*
//SMPPTS  DD  DSN=APL2.SMPPTS,
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),
//            DISP=(NEW,CATLG,DELETE),
//            SPACE=(6160,(75,10,5)),
//            UNIT=SYSDA
//*
//SMPSCDS DD  DSN=APL2.SMPSCDS,
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),
//            DISP=(NEW,CATLG,DELETE),
//            SPACE=(6160,(100,10,50)),
//            UNIT=SYSDA
//*
//SMPSTS  DD  DSN=APL2.SMPSTS,
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=6160),
//            DISP=(NEW,CATLG,DELETE),
//            SPACE=(6160,(80,10,5)),
//            UNIT=SYSDA
//*
//*
//*********************************************************************
//*    INITIALIZE THE CSI DATA SET                                    *
//*********************************************************************
//*
//SETUP1   EXEC PGM=IDCAMS
//SYSPRINT DD  SYSOUT=*
//SMPCSI   DD  DSN=APL2.SMPCSI.CSI,DISP=SHR
//ZPOOL    DD  DSN=SYS1.MACLIB(GIMZPOOL),DISP=SHR
//SYSIN    DD  *
  REPRO OUTFILE(SMPCSI) INFILE(ZPOOL)
//*
//SETUP2  EXEC AP2PSMPE
//SMPCNTL   DD *
SET BDY(GLOBAL).
UCLIN.
ADD   GLOBALZONE
           FMID(HLO1222)
           OPTIONS(APLOPT1)
           SREL(Z038)
           ZONEINDEX((APLTGT1,APL2.SMPCSI.CSI,TARGET),
                     (APLDLB1,APL2.SMPCSI.CSI,DLIB)).
ADD   OPTIONS(APLOPT1)
           DSSPACE(50,50,70)
           DSPREFIX(APL2).
ENDUCL.
SET BDY(APLTGT1).
UCLIN.
ADD   TARGETZONE(APLTGT1)
           OPTIONS(APLOPT1)
           RELATED(APLDLB1)
           SREL(Z038).
ENDUCL.
```

```
| SET BDY(APLDLB1).
| UCLIN.
| ADD   DLIBZONE(APLDLB1)
|           OPTIONS(APLOPT1)
|           RELATED(APLTGT1)
|           SREL(Z038).
| ENDUCL.
| /*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //*
| //* JES3 SYSTEMS - STEP ALLOC1 MUST BE COPIED INTO A SEPARATE JOB
| //*                TO BE RUN BEFORE THE ALLOC2, SETUP1 AND SETUP2
| //*                STEPS.
| //*
| //* JOB STATEMENT            ALL PARAMETERS
| //* DEFINE CLUSTER STATEMENT CLUSTER NAME, IF DESIRED. IF YOU CHANGE THE
| //*                          NAME, CHANGE IT ALSO IN THE MEMBER AP2PSMPE
| //*                          BEFORE COPYING IT TO SYS1.PROCLIB, IN THE
| //*                          SMPCSI DD STATEMENT BELOW, AND IN THE ADD
| //*                          GLOBALZONE STATEMENT BELOW.
| //* DEFINE CLUSTER STATEMENT VOLUME PARAMETER, USING THE VOLUME SERIAL
| //*                          USED IN THE APLDASD DD STATEMENT.
| //* DEFINE CLUSTER STATEMENT DATA COMPONENT NAME, IF DESIRED.
| //* DEFINE CLUSTER STATEMENT INDEX COMPONENT NAME, IF DESIRED.
| //* DEFINE CLUSTER STATEMENT USER CATALOG NAME, IF YOU CHANGED THE NAME
| //*                          IN THE DEFINE USERCATALOG STATEMENT. IF
| //*                          YOU ARE USING THE MASTER CATALOG, DELETE
| //*                          THE CATALOG PARAMETER.
| //* ALL DD STATEMENTS        DATA SET NAMES AND CHARACTERISTICS, IF
| //*                          DESIRED. IF YOU CHANGE THE NAMES, CHANGE
| //*                          THEM ALSO IN THE MEMBER AP2PSMPE BEFORE
| //*                          COPYING IT TO SYS1.PROCLIB AND IN MEMBER
| //*                          AP2JEAPE.
| //* SMPCSI DD STATEMENT      CLUSTER NAME, IF CHANGED IN THE DEFINE
| //*                          CLUSTER ABOVE.
| //* ZPOOL DD STATEMENT       DATA SET NAME, IF NECESSARY. THE MACRO
| //*                          LIBRARY CONTAINING THE SMP/E MACROS IS
| //*                          REQUIRED.
| //* ADD GLOBALZONE STMT      CSI CLUSTER NAME IN ZONEINDEX PARAMETER
| //*                          (TWICE), IF YOU CHANGED THE NAME IN THE
| //*                          DEFINE CLUSTER STATEMENT.
| //* ADD OPTIONS              DSPREFIX, IF DESIRED. THIS INDICATES THE
| //*                          HIGH-LEVEL QUALIFIER USED FOR THE
| //*                          TEMPORARY DATASETS USED BY RECEIVE.
```

AP2JEREE

AP2JEREE loads APL2 Application Environment into temporary data sets.

```
| //AP2JEREE JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
| //             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
| //*
| //*******************************************************************
| //* APL2 VERSION 2 RELEASE 2                                        *
| //* LICENSED MATERIALS - PROPERTY OF IBM                            *
| //* 5688-229 (C) COPYRIGHT IBM CORP. 1987, 1994.                    *
| //* SEE COPYRIGHT INSTRUCTIONS.                                     *
| //*******************************************************************
| //*
| //*******************************************************************
| //*   THIS JOB WILL RECEIVE THE APL2 APPLICATION ENVIRONMENT        *
| //*   LICENSED PROGRAM.                                             *
| //*******************************************************************
| //*
| //RECEIVE EXEC AP2PSMPE
| //SMPHOLD DD DUMMY
| //SMPPTFIN  DD DISP=SHR,DSN=SMPMCS,
| //     UNIT=3480,VOL=SER=LO1222,LABEL=(1,SL)
| //SMPCNTL   DD *
|      SET        BDY(GLOBAL).
|      RECEIVE    S (HLO1222).
| //*
| //*******************************************************************
| //*   THIS STEP WILL LIST THE SMP INFORMATION FROM THE CONTROL      *
| //*   DATA SET.                                                     *
| //*******************************************************************
| //*
| //LIST     EXEC AP2PSMPE
| //SMPCNTL   DD *
|      SET BDY(GLOBAL).
|      LIST LOG.
|      LIST GLOBALZONE SYSMOD.
|      LIST FORFMID(HLO1222).
| /*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //* JOB STATEMENT            ALL PARAMETERS
| //* SMPPTFIN DD STATEMENT    TAPE UNIT TYPE, IF NECESSARY.
| //*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //*             WHEN USING FOR RECEIVE OF PTF'S
| //* SMPPTFIN DD STATEMENT    POINT TO THE PTF LOCATION(S)
| //* RECEIVE  COMMAND         CHANGE FMID NUMBER TO PTF NUMBER(S)
```

AP2JEAPE

AP2JEAPE applies any user modifications, link-edits the APL2 load modules, and loads APL2 run-time files into target libraries.

```
| //AP2JEAPE JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
| //             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
| //*
| //*******************************************************************
| //* APL2 VERSION 2 RELEASE 2                                        *
| //* LICENSED MATERIALS - PROPERTY OF IBM                            *
| //* 5688-229 (C) COPYRIGHT IBM CORP. 1987, 1994.                    *
| //* SEE COPYRIGHT INSTRUCTIONS.                                     *
| //*******************************************************************
| //*
| //*******************************************************************
| //*   THIS JOB WILL DO THE APPLY FOR THE APL2 APPLICATION           *
| //*   ENVIRONMENT LICENSED PROGRAM, INCLUDING ANY OPTIONAL          *
| //*   USERMOD(S).  IF THERE ARE USERMODS, THEN THE APPLY            *
| //*   STATEMENT MUST BE EDITED TO INCLUDE THE USERMOD IDS.          *
| //*******************************************************************
| //*
| //APPLY    EXEC AP2PSMPE
| //*                        APL2 TARGET LIBRARIES
| //SAP2LMDS  DD DISP=OLD,DSN=SYS1.LINKLIB
| //SAP2GSVP  DD DISP=OLD,DSN=SYS1.LINKLIB
| //SAP2SYSH  DD DISP=OLD,DSN=SYS1.HELP
| //SAP2SRCL  DD DISP=OLD,DSN=APL2.SAP2SRCL
| //SAP2PROF  DD DISP=OLD,DSN=APL2.SAP2PROF
| //SAP2NICK  DD DISP=OLD,DSN=APL2.SAP2NICK
| //SAP2LANG  DD DISP=OLD,DSN=APL2.SAP2LANG
| //SAP2HELP  DD DISP=OLD,DSN=APL2.SAP2HELP
| //SAP2FNTL  DD DISP=OLD,DSN=APL2.SAP2FNTL
| //SAP2FNTP  DD DISP=OLD,DSN=SYS1.FONT38PP
| //SAP2FNT2  DD DISP=OLD,DSN=SYS1.FONT3820
| //*                        SYSLIB CONCATENATION
| //SYSLIB    DD DISP=SHR,DSN=APL2.SMPMTS
| //          DD DISP=SHR,DSN=APL2.AAP2MACS
| //          DD DISP=SHR,DSN=SYS1.MACLIB
| //SMPCNTL   DD *
|     SET        BDY(APLTGT1).
|     APPLY      S ( HLO1222
|                 /* XXXXXXX   /* DELETE FIRST '/*' IF USERMOD DESIRED */
|                  )
|                 COMPRESS(ALL)
|                 CHECK .
| /*
| //*          UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //* JOB STATEMENT            ALL PARAMETERS
| //* SAP2GSVP DD STATEMENT    DATA SET NAME, IF DESIRED. IF THE GLOBAL SV
| //*                          WILL NOT BE INSTALLED INTO SYS1.LINKLIB
| //*                          (THE DEFAULT), CHANGE THE NAME TO THE NAME
| //*                          OF THE TARGET LIBRARY USED.
| //* SAP2LMDS DD STATEMENT    DATA SET NAME, IF DESIRED. IF THE APL2 LOAD
| //*                          MODULES OTHER THAN THE GLOBAL SVP MODULES
| //*                          WILL NOT BE INSTALLED INTO SYS1.LINKLIB
| //*                          (THE DEFAULT), CHANGE THE NAME TO THE NAME
```

```
| //*                          OF THE TARGET LIBRARY USED.
| //* SAP2SYSH DD STATEMENT    DATA SET NAME, IF DESIRED. IF THE APL2 HELP
| //*                          DATA WILL NOT BE INSTALLED INTO SYS1.HELP
| //*                          (THE DEFAULT), CHANGE THE NAME TO THE NAME
| //*                          OF THE TARGET LIBRARY USED.
| //* SAP2FNTP DD STATEMENT    DATA SET NAME, IF DESIRED. IF THE APL2
| //*                          38PP FONTS WILL NOT BE INSTALLED INTO
| //*                          SYS1.FONT38PP (THE DEFAULT), CHANGE THE
| //*                          NAME TO THE NAME OF THE TARGET LIBRARY.
| //* SAP2FNT2 DD STATEMENT    DATA SET NAME, IF DESIRED. IF THE APL2
| //*                          3820 FONTS WILL NOT BE INSTALLED INTO
| //*                          SYS1.FONT3820 (THE DEFAULT), CHANGE THE
| //*                          NAME TO THE NAME OF THE TARGET LIBRARY.
| //* ALL OTHER DD STMTS       DATA SET NAMES, IF YOU CHANGED THEM IN THE
| //*                          AP2JEALC JOB.
| //* SET STATEMENT           TARGET ZONE NAME, IF YOU CHANGED IT IN THE
| //*                          AP2JESME JOB.
| //* APPLY STATEMENT          USERMOD IDENTIFIER, IF A USERMOD IS TO BE
| //*                          APPLIED WITH THE PRODUCT.
| //* APPLY STATEMENT          CHECK PARAMETER, IF DESIRED. SEE THE
| //*                          INSTALLATION INSTRUCTIONS.
| //*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //*             WHEN USING FOR APPLY OF PTF'S
| //* APPLY    COMMAND         CHANGE FMID NUMBERS TO PTF NUMBER(S) OR
| //*                          REMOVE S (SOURCEID) CLAUSE TO APPLY ALL
```

AP2JEACE

AP2JEACE places APL2 Application Environment into the APL2 distribution libraries as permanent backup.

```
| //AP2JEACE JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
| //             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
| //*
| //*******************************************************************
| //* APL2 VERSION 2 RELEASE 2                                        *
| //* LICENSED MATERIALS - PROPERTY OF IBM                            *
| //* 5688-229 (C) COPYRIGHT IBM CORP. 1987, 1994.                    *
| //* SEE COPYRIGHT INSTRUCTIONS.                                     *
| //*******************************************************************
| //*
| //*******************************************************************
| //*   THIS JOB WILL DO THE ACCEPT FOR THE APL2 APPLICATION          *
| //*   ENVIRONMENT LICENSED PROGRAM, INCLUDING ANY OPTIONAL          *
| //*   USERMODS(S).  IF THERE ARE USERMODS, THEN THE ACCEPT          *
| //*   STATEMENT MUST BE EDITED TO INCLUDE THE USERMOD IDS.          *
| //*******************************************************************
| //*
| //ACCEPT   EXEC AP2PSMPE
| //*                        APL2 DISTRIBUTION LIBRARIES
| //AAP2MODS  DD DISP=OLD,DSN=APL2.AAP2MODS
| //AAP2MACS  DD DISP=OLD,DSN=APL2.AAP2MACS
| //AAP2SRCL  DD DISP=OLD,DSN=APL2.AAP2SRCL
| //AAP2PROF  DD DISP=OLD,DSN=APL2.AAP2PROF
| //AAP2NICK  DD DISP=OLD,DSN=APL2.AAP2NICK
| //AAP2SAMP  DD DISP=OLD,DSN=APL2.AAP2SAMP
| //AAP2LANG  DD DISP=OLD,DSN=APL2.AAP2LANG
| //AAP2HELP  DD DISP=OLD,DSN=APL2.AAP2HELP
| //AAP2FNTL  DD DISP=OLD,DSN=APL2.AAP2FNTL
| //AAP2FNTP  DD DISP=OLD,DSN=APL2.AAP2FNTP
| //AAP2FNT2  DD DISP=OLD,DSN=APL2.AAP2FNT2
| //*                        SYSLIB CONCATENATION
| //SYSLIB    DD DISP=SHR,DSN=APL2.SMPMTS
| //          DD DISP=SHR,DSN=APL2.AAP2MACS
| //          DD DISP=SHR,DSN=SYS1.MACLIB
| //SMPCNTL   DD *
|      SET        BDY(APLDLB1).
|      ACCEPT     S ( HLO1222
|                  /* XXXXXXX   /* DELETE FIRST '/*' IF USERMOD DESIRED */
|                   )
|                  /* USERMODS  /* DELETE FIRST '/*' IF USERMOD DESIRED */
|                   COMPRESS(ALL)
|                   CHECK .
| /*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //* JOB STATEMENT            ALL PARAMETERS
| //* ALL DD STMTS             DATA SET NAMES, IF YOU CHANGED THEM IN THE
| //*                          AP2JEALC JOB.
| //* SET STATEMENT            DLIB ZONE NAME, IF YOU CHANGED IT IN THE
| //*                          AP2JESME JOB.
| //* ACCEPT STATEMENT         USERMOD IDENTIFIER, IF A USERMOD IS TO BE
| //*                          ACCEPTED WITH THE PRODUCT.
| //* ACCEPT STATEMENT         USERMODS PARAMETER, IF A USERMOD IS TO BE
```

```
| //*                          ACCEPTED WITH THE PRODUCT.
| //* ACCEPT STATEMENT         CHECK PARAMETER, IF DESIRED. SEE THE
| //*                          INSTALLATION INSTRUCTIONS.
| //*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //*             WHEN USING FOR ACCEPT OF PTF'S
| //* ACCEPT   COMMAND         CHANGE FMID NUMBERS TO PTF NUMBER(S) OR
| //*                          REMOVE S (SOURCEID) CLAUSE TO ACCEPT ALL
```

AP2JEVSM

AP2JEVSM allocates VSAM clusters for APL2 libraries.

```
| //AP2JEVSM JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
| //             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
| //*
| //*******************************************************************
| //* APL2 VERSION 2 RELEASE 2                                        *
| //* LICENSED MATERIALS - PROPERTY OF IBM                            *
| //* 5688-229 (C) COPYRIGHT IBM CORP. 1987, 1994.                    *
| //* SEE COPYRIGHT INSTRUCTIONS.                                     *
| //*******************************************************************
| //*
| //*******************************************************************
| //*   THIS JOB ALLOCATES A VSAM CLUSTER FOR A FILE LIBRARY FOR A    *
| //*   TSOUSER.                                                      *
| //*                                                                 *
| //*   FILE LIBRARIES ARE USED FOR APL DATA FILES (FILES ACCESSED BY *
| //*   AP 121 AND PROCESSOR 12).                                     *
| //*                                                                 *
| //*   THIS STEP CAN BE TAILORED AND REPEATED AS NECESSARY FOR       *
| //*   INDIVIDUAL APL2 USERS OR FOR CREATING LOCAL PUBLIC LIBRARY    *
| //*   FILES FOR YOUR INSTALLATION.                                  *
| //*******************************************************************
| //*
| //ALLOC1   EXEC PGM=IDCAMS
| //STEPCAT DD DSN=APLUCAT,DISP=OLD
| //SYSPRINT DD  SYSOUT=*
| //SYSIN    DD  *
|  DEF CLUSTER (NAME(USERID.TSOUSER.FILES)        -
|               VOL(APLVOL)                      -
|               CYLINDERS(2 1)                   -
|               SPEED                            -
|               SHR(2))                          -
|               INDEX(IMBED REPL)                -
|               DATA (KEYS(14 0) RECSZ(1048 4088) CISZ(4096)) -
|               CATALOG(APLUCAT)
|               /*                              */
| /*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //* JOB STATEMENT            ALL PARAMETERS
| //* STEPCAT DD STATEMENT     THE NAME OF THE VSAM USER CATALOG DEFINED
| //*                          IN THE AP2JESME JOB. IF USING THE MASTER
| //*                          CATALOG, DELETE THIS DD STATEMENT.
| //* DEFINE CLUSTER STMT(S)   THE NAME OF THE CLUSTER(S), ACCORDING TO
| //*                          THE NAMING CONVENTION IN THE USER'S
| //*                          ENVIRONMENT, IN THE NAME PARAMETER
| //* DEFINE CLUSTER STMT(S)   THE VOLUME SERIAL NUMBER IN THE VOLUME
| //*                          PARAMETER
| //* DEFINE CLUSTER STMT(S)   THE ALLOCATION FOR THE CLUSTER(S), APPROP-
| //*                          RIATE TO THE ANTICIPATED SIZE OF THE
| //*                          LIBRARY(S), IN THE CYLINDERS OR RECORDS
| //*                          PARAMETER
| //* DEFINE CLUSTER STMT(S)   THE NAME OF THE VSAM USER CATALOG DEFINED
| //*                          IN THE AP2JESME JOB AND REFERENCED IN
| //*                          THE STEPCAT DD STATEMENT. IF USING THE
```

```
| //*                          MASTER CATALOG, DELETE THE CATALOG
| //*                          PARAMETER.
```

Sample JCL For APL2 and APL2 Application Environment

The following sample JCL statements are common to APL2 and APL2 Application Environment.

AP2PSMPE

This procedure is used by other jobs that access SMP.

```
| //AP2PSMPE PROC
| //*
| //*********************************************************************
| //* APL2 VERSION 2 RELEASE 2                                          *
| //* LICENSED MATERIALS - PROPERTY OF IBM                              *
| //* 5688-228, 5688-229 (C) COPYRIGHT IBM CORP. 1984, 1994.           *
| //* SEE COPYRIGHT INSTRUCTIONS.                                      *
| //*********************************************************************
| //*
| //*********************************************************************
| //*   SMPE PROCEDURE                                                  *
| //*********************************************************************
| //*
| //SMPE    EXEC PGM=GIMSMP,PARM='DATE=U',REGION=4096K
| //*                       STEPCAT
| //STEPCAT   DD DISP=OLD,DSN=APLUCAT
| //*                       SMP DATA SETS
| //SMPOUT    DD SYSOUT=*
| //SMPRPT    DD SYSOUT=*
| //SMPLIST   DD SYSOUT=*
| //SYSPRINT  DD SYSOUT=*
| //SMPCSI    DD DISP=SHR,DSN=APL2.SMPCSI.CSI
| //SMPLOG    DD DISP=MOD,DSN=APL2.SMPLOG
| //SMPMTS    DD DISP=OLD,DSN=APL2.SMPMTS
| //SMPPTS    DD DISP=OLD,DSN=APL2.SMPPTS
| //SMPSCDS   DD DISP=OLD,DSN=APL2.SMPSCDS
| //SMPSTS    DD DISP=OLD,DSN=APL2.SMPSTS
| //SMPTLIB   DD DISP=OLD,UNIT=UUUU,VOL=SER=VVVVVV
| //SMPWRK1   DD UNIT=SYSDA,SPACE=(CYL,(5,5,99)),DISP=(,DELETE),
| //             DCB=BLKSIZE=6160
| //SMPWRK2   DD UNIT=SYSDA,SPACE=(CYL,(5,5,99)),DISP=(,DELETE),
| //             DCB=BLKSIZE=6160
| //SMPWRK3   DD UNIT=SYSDA,SPACE=(CYL,(5,5,99)),DISP=(,DELETE),
| //             DCB=BLKSIZE=6160
| //SMPWRK4   DD UNIT=SYSDA,SPACE=(CYL,(5,5,99)),DISP=(,DELETE),
| //             DCB=BLKSIZE=6160
| //SMPWRK6   DD UNIT=SYSDA,SPACE=(CYL,(5,5,99)),DISP=(,DELETE),
| //             DCB=BLKSIZE=6160
| //*                       UTILITY DATA SETS
| //SYSUT1    DD UNIT=SYSDA,SPACE=(CYL,(10,5))
| //SYSUT2    DD UNIT=SYSDA,SPACE=(CYL,(10,5))
| //SYSUT3    DD UNIT=SYSDA,SPACE=(CYL,(10,5))
| //SYSUT4    DD UNIT=SYSDA,SPACE=(CYL,(10,5))
| //          PEND
| //*           UPDATE DIRECTORY FOR THIS PROCEDURE
| //* EXEC STATEMENT           REGION SIZE, IF NECESSARY.
| //* STEPCAT DD STATEMENT     THE NAME OF THE VSAM USER CATALOG DEFINED
```

```
| //*                          IN THE AP2JBSME OR AP2JESME JOB. IF THE
| //*                          MASTER CATALOG WILL BE USED, DELETE THIS
| //*                          DD STATEMENT.
| //* SMPCSI DD STATEMENT      THE CLUSTER NAME DEFINED IN THE AP2JBSME
| //*                          OR AP2JESME JOB.
| //* SMPTLIB DD STATEMENT     UNIT TYPE AND VOLUME SERIAL NUMBER FOR A
| //*                          VOLUME ON WHICH SMP CAN ALLOCATE RELFILE
| //*                          DATA SETS.
| //* ALL OTHER DD STMTS       DATA SET NAMES, IF DESIRED. IF YOU CHANGED
| //*                          THE NAMES OF THE APL2 SMP DATA SETS IN THE
| //*                          AP2JBSME OR AP2JESME JOB,
| //*                          CHANGE THEM HERE ALSO.
| //* PEND STATEMENT           REMOVE IF THIS PROCEDURE WILL BE INSTALLED
| //*                          INTO SYS1.PROCLIB.
```

AP2JBND3

This job performs the functions necessary to install APL2 on DATABASE/2 (DB2) Version 2 Release 3 or later. DB2 must be running when this job is run.

```
| //AP2JBND3 JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
| //             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
| //*
| //*********************************************************************
| //* APL2 VERSION 2 RELEASE 2                                          *
| //* LICENSED MATERIALS - PROPERTY OF IBM                              *
| //* 5688-228, 5688-229 (C) COPYRIGHT IBM CORP. 1994.                  *
| //* SEE COPYRIGHT INSTRUCTIONS.                                       *
| //*********************************************************************
| //*
| //*********************************************************************
| //*  THIS JOB PERFORMS THE FUNCTIONS NECESSARY TO INSTALL APL2 ON     *
| //*  DATABASE 2 (DB2) VERSION 2 RELEASE 3 OR LATER. DB2 IS REQUIRED   *
| //*  TO BE RUNNING WHEN THIS JOB IS EXECUTED                          *
| //*********************************************************************
| //*
| //STEP1   EXEC  PGM=IKJEFT01,REGION=2048K
| //*********************************************************************
| //*  THIS FIRST STEP BINDS THE APL2 APPLICATION TO DB2.  THE DATA     *
| //*  BASE REQUEST MODULE (DBRM) SHIPPED WITH APL2 IS POINTED TO       *
| //*  IN THE LIBRARY 'APL2.SAP2SRCL' AND USED TO UPDATE THE DB2 TABLES *
| //*  AND CREATE THE LOCAL PACKAGES AND PLANS.                         *
| //*********************************************************************
| //STEPLIB  DD DSN=DSN.DSN.DSNLOAD,DISP=SHR
| //SYSTSPRT DD SYSOUT=*,DCB=BLKSIZE=121
| //SYSPRINT DD SYSOUT=*
| //SYSUDUMP DD SYSOUT=*
| //SYSTSIN  DD *
| DSN SYSTEM(DSN)
| BIND  PACKAGE(AP2V2R2C) -
|       MEMBER(AP2DB22) -
|       LIBRARY('APL2.SAP2SRCL') -
|       ISOLATION(CS)
| BIND  PACKAGE(AP2V2R2R) -
|       MEMBER(AP2DB22) -
|       LIBRARY('APL2.SAP2SRCL') -
|       ISOLATION(RR)
| BIND  PLAN(AP2V2R2C) -
|       PKLIST(*.AP2V2R2C.*) -
|       ISOLATION(CS)
| BIND  PLAN(AP2V2R2R) -
|       PKLIST(*.AP2V2R2R.*) -
|       ISOLATION(RR)
| END
| /*
| //STEP2   EXEC  PGM=IKJEFT01,REGION=2048K
| //*********************************************************************
| //*  THIS SECOND STEP GRANTS ALL AP127 USERS (PUBLIC) RUN             *
| //*  AUTHORITIES TO DB2 THROUGH THE APL APPLICATION PLAN.             *
| //*********************************************************************
| //STEPLIB  DD DSN=DSN.DSN.DSNLOAD,DISP=SHR
| //SYSTSPRT DD SYSOUT=*,DCB=BLKSIZE=121
```

```
//SYSPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//SYSTSIN  DD *
DSN SYSTEM(DSN)
RUN PROGRAM(DSNTIAD) LIB('DSN.DSN.RUNLIB.LOAD')
END
/*
//SYSIN DD *
     GRANT EXECUTE ON PLAN    AP2V2R2C TO PUBLIC;
     GRANT EXECUTE ON PLAN    AP2V2R2R TO PUBLIC;
     GRANT EXECUTE ON PACKAGE AP2V2R2C.* TO PUBLIC;
     GRANT EXECUTE ON PACKAGE AP2V2R2R.* TO PUBLIC;
/*
//*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
//* JOB STATEMENT            ALL PARAMETERS
//* STEPLIB DD STATEMENT     DATA SET NAME, IF NECESSARY.
//* DSN STATEMENTS           SUBSYSTEM ID FOR DB2, IF NECESSARY.
//* BIND STATEMENT           THE DATA SET NAME IN THE LIBRARY PARAMETER,
//*                          IF THE NAME OF THE TARGET LIBRARY FOR THE
//*                          DBRM WAS CHANGED IN THE AP2JBALC
//*                          OR AP2JEALC JOB.
//* RUN STATEMENT            THE DATA SET NAME IN THE LIB PARAMETER, IF
//*                          NECESSARY.
```

AP2JBNDR

This job issues remote binds for the APL2 packages to relational database systems outside the local system.

```
| //AP2JBNDR JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
| //             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
| //*
| //*********************************************************************
| //* APL2 VERSION 2 RELEASE 2                                          *
| //* LICENSED MATERIALS - PROPERTY OF IBM                              *
| //* 5688-228, 5688-229 (C) COPYRIGHT IBM CORP. 1994.                  *
| //* SEE COPYRIGHT INSTRUCTIONS.                                       *
| //*********************************************************************
| //*
| //*********************************************************************
| //*  THIS JOB ISSUES REMOTE BINDS FOR THE APL2 PACKAGES, TO           *
| //*  RELATIONAL DATABASE SYSTEMS OUTSIDE THE LOCAL SYSTEM.            *
| //*********************************************************************
| //*
| //REMOTE  EXEC  PGM=IKJEFT01,REGION=2048K
| //*********************************************************************
| //*  THIS STEP BINDS APL2 APPLICATIONS TO REMOTE DATABASES. THE DATA  *
| //*  BASE REQUEST MODULE (DBRM) SHIPPED WITH APL2 IS POINTED TO       *
| //*  IN THE LIBRARY 'APL2.SAPRSRCL'. THE REMOTE LOCATION MUST BE      *
| //*  MODIFIED BEFORE RUNNING THE JOB.                                 *
| //*                                                                   *
| //*  AFTER THIS JOB IS RUN, THE FOLLOWING STATEMENTS MUST BE RUN      *
| //*  AT THE REMOTE SITE BY THE SAME USER WHO RUNS THIS JOB.           *
| //*     GRANT EXECUTE ON PACKAGE AP2V2R2R TO PUBLIC                   *
| //*     GRANT EXECUTE ON PACKAGE AP2V2R2C TO PUBLIC                   *
| //*  THIS CAN BE DONE WITH SPUFY OR FROM WITHIN APL2                  *
| //*********************************************************************
| //STEPLIB  DD DSN=DSN.DSN.DSNLOAD,DISP=SHR
| //SYSTSPRT DD SYSOUT=*,DCB=BLKSIZE=121
| //SYSPRINT DD SYSOUT=*
| //SYSUDUMP DD SYSOUT=*
| //SYSTSIN  DD *
| DSN SYSTEM(DSN)
| BIND  PACKAGE(location.AP2V2R2C) -
|       MEMBER(AP2DB22) -
|       LIBRARY(APL2.SAP2SRCL) -
|       ISOLATION(CS)
| BIND  PACKAGE(location.AP2V2R2R) -
|       MEMBER(AP2DB22) -
|       LIBRARY(APL2.SAP2SRCL) -
|       ISOLATION(RR)
| END
| /*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //* JOB STATEMENT            ALL PARAMETERS
| //* STEPLIB DD STATEMENT     DATA SET NAME, IF NECESSARY.
| //* DSN STATEMENTS           SUBSYSTEM ID FOR DB2, IF NECESSARY.
| //* BIND STATEMENT           THE NAME OF THE REMOTE LOCATION
| //* BIND STATEMENT           THE DATA SET NAME IN THE LIBRARY PARAMETER,
| //*                         IF THE NAME OF THE TARGET LIBRARY FOR THE
```

```
| //*                          DBRM WAS CHANGED IN THE AP2JBALC
| //*                          OR AP2JEALC JOB.
```

AP2JDEFN

AP2JDEFN defines a VSAM user catalog and defines the high-level qualifier 'APL2' as a connector to the user catalog.

```
| //AP2JDEFN JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
| //             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
| //*
| //*******************************************************************
| //* APL2 VERSION 2 RELEASE 2                                        *
| //* LICENSED MATERIALS - PROPERTY OF IBM                            *
| //* 5688-228, 5688-229 (C) COPYRIGHT IBM CORP. 1984, 1994.          *
| //* SEE COPYRIGHT INSTRUCTIONS.                                     *
| //*******************************************************************
| //*
| //*******************************************************************
| //*   DEFINE A VSAM USER CATALOG,                                   *
| //*   DEFINE THE HIGH-LEVEL QUALIFIER 'APL2' AS A CONNECTOR TO      *
| //*   THE USER CATALOG
| //*******************************************************************
| //ALLOC    EXEC PGM=IDCAMS
| //APLDASD  DD  UNIT=SYSDA,DISP=OLD,VOL=SER=APLVOL
| //SYSPRINT DD  SYSOUT=*
| //SYSIN    DD  *
|   DEFINE USERCATALOG -
|      (NAME(APLUCAT) -
|       FILE(APLDASD) -
|       CYL(10 1) -
|       VOLUME(APLVOL))
|   DEFINE ALIAS (NAME(APL2) RELATE(APLUCAT))
| /*
| //*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //* JOB STATEMENT            ALL PARAMETERS
| //* APLDASD DD STATEMENTS    VOLUME SERIAL NUMBER. CHANGE THE NAME ALSO
| //*                          IN THE VOLUME PARAMETER OF THE DEFINE
| //*                          USERCATALOG STATEMENT AND THE DEFINE
| //*                          CLUSTER STATEMENT.
| //* DEFINE USERCATALOG STMT  USER CATALOG NAME, IF DESIRED. IF YOU
| //*                          CHANGE THE NAME, CHANGE IT ALSO IN THE
| //*                          DEFINE ALIAS STATEMENT.
| //* DEFINE USERCATALOG STMT  VOLUME PARAMETER, USING THE VOLUME SERIAL
| //*                          USED IN THE APLDASD DD STATEMENT.
| //* DEFINE ALIAS STATEMENT   HIGH-LEVEL QUALIFIER, IF A DIFFERENT NAMING
| //*                          CONVENTION IS TO BE USED. IF SO, CHANGE THE
| //*                          HIGH-LEVEL QUALIFIER IN THE DATA SET NAMES
| //*                          IN MEMBERS AP2JBALC, AP2JBAPE, AP2JPROF,
| //*                          AP2JFONT, AP2JBSME, AND AP2JBACE,
| //*                          AS WELL AS THIS ONE.  (FOR APPLICATION
| //*                          ENVIRONMENT, CHANGE AP2JEALC, AP2JEAPE,
| //*                          AP2JFONT, AP2JESME, AND AP2JEACE)
| //* DEFINE ALIAS STATEMENT   USER CATALOG NAME, IF YOU CHANGED THE
| //*                          NAME IN THE DEFINE USERCATALOG STATEMENT.
```

AP2JFONT

AP2JFONT loads the APL2 fonts into IMAGELIB.

```
| //AP2JFONT JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
| //             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
| //*
| //*********************************************************************
| //* APL2 VERSION 2 RELEASE 2                                          *
| //* LICENSED MATERIALS - PROPERTY OF IBM                              *
| //* 5688-228, 5688-229 (C) COPYRIGHT IBM CORP. 1984, 1994.           *
| //* SEE COPYRIGHT INSTRUCTIONS.                                       *
| //*********************************************************************
| //*
| //*********************************************************************
| //*    EXECUTE THIS JCL JOB TO BUILD THE APL GRAPHIC CHARACTER        *
| //*    MODIFICATION MODULES FOR THE 3800 MODEL 1 AND 3800 MODEL 3     *
| //*    (COMPATIBILTY MODE) AND THE APL CHARACTER ARRANGEMENT TABLES   *
| //*********************************************************************
| //*
| //S1     EXEC PGM=IEBIMAGE
| //SYSUT1 DD DSNAME=SYS1.IMAGELIB,DISP=OLD
| //SYSPRINT DD SYSOUT=*
| //*     THE FOLLOWING MEMBERS ARE FOR THE MODEL 1 GRAPHMODS
| //SYSIN DD DSNAME=APL2.SAP2FNTL(AP2AD0G1),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AD2G1),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AG0G1),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AG2G1),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AG5G1),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AI0G1),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AI2G1),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AT0G1),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AT2G1),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2APLG1),DISP=OLD
| //*     THE FOLLOWING MEMBERS ARE FOR THE MODEL 3 GRAPHMODS
| //      DD DSNAME=APL2.SAP2FNTL(AP2AD0G3),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AD2G3),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AG0G3),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AG2G3),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AG5G3),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AI0G3),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AI2G3),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AT0G3),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AT2G3),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2APLG3),DISP=OLD
| //*     THE FOLLOWING MEMBERS ARE FOR THE CHARACTER ARRANGEMENT TABLES
| //      DD DSNAME=APL2.SAP2FNTL(AP2AD0XT),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AD2XT),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AG0XT),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AG2XT),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AG5XT),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AI0XT),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AI2XT),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AT0XT),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2AT2XT),DISP=OLD
| //      DD DSNAME=APL2.SAP2FNTL(AP2APLXT),DISP=OLD
| //*          UPDATE DIRECTORY FOR THIS SAMPLE JOB
```

```
| //* JOB STATEMENT            ALL PARAMETERS
| //* SYSPRINT DD STATEMENT    SYSOUT CLASS, IF NECESSARY. THIS JOB
| //*                          PRODUCES APPROXIMATELY 178000 LINES OF
| //*                          OUTPUT.
| //* SYSIN DD STATEMENTS      DATA SET NAMES, IF YOU CHANGED THE NAME OF
| //*                          THE TARGET LIBRARY FOR FONTS IN THE
| //*                          AP2JBALC OR AP2JEALC JOB.
```

AP2JUSRE

AP2JUSRE is the job control language (JCL) used to receive USERMODs.

```
| //AP2JUSRE JOB (ACCOUNT),PROGAMER,CLASS=A,TIME=(1),
| //             NOTIFY=USERID,MSGCLASS=A,MSGLEVEL=(1,1)
| //*
| //*********************************************************************
| //* APL2 VERSION 2 RELEASE 2                                          *
| //* LICENSED MATERIAL - PROPERTY OF IBM                               *
| //* 5688-228, 5688-229 (C) COPYRIGHT IBM CORP. 1984, 1994.           *
| //* SEE COPYRIGHT INSTRUCTIONS                                        *
| //*********************************************************************
| //*
| //*********************************************************************
| //*   THIS JOB WILL RECEIVE A USERMOD TO RE-ASSEMBLE MODULE AP2TIOPT  *
| //*   (OR AP2TIOPX) TO CHANGE DEFAULT INFORMATION.                    *
| //*   THIS JOB NEED ONLY BE EXECUTED IF CHANGES TO THE SYSTEM         *
| //*   OPTIONS ARE DESIRED, SUCH AS THE LIST OF THE AUXILIARY          *
| //*   PROCESSORS INSTALLED OR THE SPACE TO BE RESERVED FOR THE        *
| //*   ACTIVE WORKSPACE.                                               *
| //*                                                                   *
| //* ** THIS JOB MAY ALSO BE USED TO CREATE INSTALLATION EXITS BY      *
| //*    MODIFYING THE MODULE AP2TIUSR.                                 *
| //* ** THIS JOB MAY ALSO BE USED TO MODFIFY THE APL2 INVOCATION       *
| //*    STATEMENT FOR APL2PI IN AP2XAPIC.                              *
| //*********************************************************************
| //*
| //USERMOD EXEC AP2PSMPE
| //SMPHOLD DD DUMMY
| //SMPPTFIN  DD *
| ++ USERMOD  ( XXXXXXX  ).
| ++ VER      ( Z038     )  FMID  ( HLO1221 ).
| ++ SRCUPD   ( AP2TIOPT  ).
|       --->> ./ CHANGE NAME=AP2TIOPT <<---
|       --->> SOURCE CHANGES GO HERE  <<---
|       --->> NOTE: SEQ NUMBERS MUST BE IN 73-80 AS APPEAR IN THE
|       --->>       AP2TIOPT SOURCE CODE TO REPLACE THE CORRECT
|       --->>       CARD IMAGE ON THE FILE (CONTINUATION MAY BE
|       --->>       REQUIRED IN COLUMN 72).
|       --->> SOURCE CHANGES GO HERE  <<---
|       --->> ./ ENDUP                <<---
| //SMPCNTL   DD *
|      SET  BDY(GLOBAL).
|      RECEIVE    S ( XXXXXXX ).
| /*
| //*           UPDATE DIRECTORY FOR THIS SAMPLE JOB
| //* JOB STATEMENT            ALL PARAMETERS
| //* ++ VER                   CHANGE THE FMID TO HLO1212 IF YOU ARE
| //*                          MODIFYING AP2TIOPX, AP2TIUSR, OR AP2XAPIC
| //* ++ USERMOD STATEMENT     USERMOD IDENTIFIER, ASSIGNED ACCORDING
| //*                          TO SMP CONVENTION.
| //* ++ SRCUPD STATEMENT      CHANGE THE NAME OF MODULE IF MODIFYING
| //*                          AP2TIUSR, AP2TIOPX, OR AP2XAPIC
| //* RECEIVE STATEMENT        USERMOD IDENTIFIER, AS SPECIFIED IN THE
| //*                          ++ USERMOD STATEMENT.
```

Appendix B. Startup Parameters for Global SVP

The startup parameters for the global SVP are to be filed in an 80-byte fixed format sequential data set. The DDNAME used to access the data set is SVPPARMS. If the data set does not contain the appropriate keyword specifications, the SVP is not started.

The keyword parameters are described in Figure 15. (Any record with an asterisk in column 1 is treated as a comment.)

Figure 15. Global SVP Keyword Parameters

Required (Yes/No)	Keyword=value	Description
Yes	CSVPNAME=*modname*	*modname* is the link-edited module name of the SVP. (AP2TCSVP should be specified unless the name of this module is changed.)
Yes	SMSIZE=*nnnn* *nnnn*K *nnnn*M	*nnnn* is the size of the global shared memory in bytes. If K is specified, *nnnn* is multiplied by 2 to the 10th power. If M is specified, *nnnn* is multiplied by 2 to the 20th power.
No	ISECNAME=*modname*	*modname* is the name of the link edited, installation written exit routine for the global SVP. If not specified, no security checking is done(see“Establishing the APL2 Installation Exit for the Global SVP” on page 75).
No	CSVPLOC= {PAGEABLE| FIXED}	The SVP, local and global security modules are to be in pageable, fixed CSA, or extended CSA (for MVS). (PAGEABLE is the default.)
No	SMLOC= {PAGEABLE| FIXED}	The shared storage is to be in pageable, fixed CSA, or extended CSA (for MVS/XA). (PAGEABLE is the default.)
No	SSID=*csvpname*	The MVS subsystem name to be associated with this SVP. One to 4 alphabetic characters. (CSVP is the default.) The value of this parameter must match the value of the APL2 system option CSVPID.
No	MAXPROC=*nnnn*	Maximum number of processors allowed to sign on. (200 is the default.)
No	TRACETBL=*nnnn* *nnnn*K *nnnn*M	*nnnn* is the size of the global SVP trace table in bytes. If K is specified, *nnnn* is multiplied by 2 to the 10th power. If M is specified, *nnnn* is multiplied by 2 to the 20th power.

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Sample startup parameters for the global SVP are provided in the member AP2XPARM of the data set *userid*.APL2INST.JCL.

AP2XPARM

AP2XPARM lists parameters referenced by the global SVP startup procedure.

```
| ********************************************************************
| * APL2 VERSION 2 RELEASE 2                                        *
| * LICENSED MATERIALS - PROPERTY OF IBM                            *
| * 5688-228, 5688-229 (C) COPYRIGHT IBM CORP. 1984, 1994.          *
| * SEE COPYRIGHT INSTRUCTIONS.                                     *
| ********************************************************************
| *                                                                  *
| *   THIS IS A SAMPLE PARAMETER LIST FOR THE STARTUP OF THE GLOBAL  *
| *   SHARED VARIABLE PROCESSOR.  THIS DATA SET SHOULD BE IDENTIFIED *
| *   BY THE SVPPARMS DD STATEMENT IN THE SVP INITIALIZATION         *
| *   PROCEDURE.                                                     *
| *                                                                  *
| ********************************************************************
| *
|           SMSIZE=32K
|           MAXPROC=50
|           CSVPNAME=AP2TCSVP
|           CSVPLOC=PAGEABLE
|           SMLOC=PAGEABLE
|           SSID=CSVP
|           ISECNAME=SVPEXIT1
| *
| *           UPDATE DIRECTORY FOR THIS FILE
| * SSID PARAMETER             SUBSYSTEM IDENTIFIER. THIS MUST BE THE SAME
| *                            IDENTIFIER SPECIFIED IN THE CSVPID SYSTEM
| *                            OPTION
| * ISECNAME PARAMETER         THE NAME OF THE LOAD MODULE CALLED BY THE
| *                            INSTALLATION EXIT TAKEN AT APL2 INVOCATION;
| *                            IF NOT FOUND, NO SECURITY CHECKING IS DONE.
| *                            THIS ROUTINE WILL BE ENTERED IN SUPERVISOR
| *                            STATE, USER KEY, ENABLED, HOLDING NO LOCKS.
```

Appendix C. AP2TIOPT/AP2TIOPX/AP2XAPIC Option Modules Source Listing

This appendix provides the installation option module sources.

APL2 Full Product Installation Options (AP2TIOPT Option Module)

```
TIOPT    TITLE 'P-AP2TIOPT: INSTALLATION OPTIONS FOR APL2/TSO'          00016990
*-P-AP2TIOPX-------------------------------------------------*         00023980
*                                                           *         00030970
* MODULE NAME: AP2TIOPT                                     *         00037960
*                                                           *         00044950
* DESCRIPTIVE NAME = APL2 INSTALLATION OPTIONS FOR TSO       *         00051940
*                                                           *         00058930
* COPYRIGHT:  Licensed Materials - Property of IBM          *         00065920
*                                                           *         00072910
*             5688-228                                      *         00083890
*             (C) COPYRIGHT IBM CORP. 1984, 1994            *         00091860
*                                                           *         00093880
*             See Copyright Instructions                    *         00100870
*                                                           *         00107860
* STATUS:     APL2 VERSION 2 RELEASE 2                      *         00119830
*                                                           *         00121840
* FUNCTION:    PERMIT INSTALLATIONS TO SPECIFY PARAMETERS    *         00128830
*              USED WHEN INVOKING AND USING APL2.           *         00135820
*                                                           *         00142810
* NOTES:                                                    *         00149800
*                                                           *         00156790
*   DEPENDENCIES: NONE                                      *         00163780
*                                                           *         00170770
*   RESTRICTIONS: TSO ONLY                                  *         00177760
*                                                           *         00184750
*   REGISTER-CONVENTIONS: N/A                               *         00191740
*                                                           *         00198730
*   PATCH-LABEL: N/A                                        *         00205720
*                                                           *         00212710
* MODULE-TYPE: TABLE                                        *         00219700
*                                                           *         00226690
*   PROCESSOR: ASSEMBLER H                                  *         00233680
*                                                           *         00240670
*   MODULE SIZE: 1K                                         *         00247660
*                                                           *         00254650
*   ATTRIBUTES:  RMODE 24                                   *         00261640
*                                                           *         00268630
*-----------------------------------------------------------*         00275620
*                                                           *         00282610
* ENTRY-POINT: AP2TIOPT                                     *         00289600
*                                                           *         00296590
*   PURPOSE:   PROVIDE PROGRAM ACCESS TO LOCAL OPTION VALUES. *       00303580
*                                                           *         00310570
*   LINKAGE:   TABLE IS MAPPED BY AP2TITOP MACRO.           *         00317560
```

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```
| *                                                               *         00324550
| *---------------------------------------------------------------*         00331540
| *                                                               *         00338530
| * INPUT:       N/A                                              *         00345520
| *                                                               *         00352510
| * OUTPUT:      N/A                                              *         00359500
| *                                                               *         00366490
| * EXIT-NORMAL: N/A                                              *         00373480
| *                                                               *         00380470
| * EXIT-ERROR:  N/A                                              *         00387460
| *                                                               *         00394450
| * EXTERNAL-REFERENCES:                                          *         00401440
| *                                                               *         00408430
| *   ROUTINES:  AS DEFINED BY THE AP2TITOP MACRO PARAMETERS.    *         00415420
| *               MAY INCLUDE:                                    *         00422410
| *               - AN INSTALLATION EXIT ROUTINE (OPTUSER)        *         00429400
| *               - RESIDENT V1 AUXILIARY PROCESSORS (RESAPS)     *         00436390
| *               - RESIDENT V2 PROCESSOR TASKS (ATASKS)          *         00443380
| *               - THE V1 AUX PROCESSOR INTERFACE (AP2TASVP)     *         00450370
| *               - THE V2 PROCESSOR INTERFACE (AP2XASRV)         *         00457360
| *                                                               *         00464350
| *   DATA-AREAS: NONE                                           *         00471340
| *                                                               *         00478330
| *   CONTROL-BLOCKS: TOP, AS DEFINED BY AP2TITOP                *         00485320
| *                                                               *         00492310
| * TABLES:      TOPAPS: RESIDENT V1 AND V2 PROCESSORS            *         00499300
| *                                                               *         00506290
| * MACROS:      SEE LIST WHICH FOLLOWS THE ASSEMBLY              *         00513280
| *                                                               *         00520270
| * CHANGE-ACTIVITY:                                              *         00527260
| *                                                               *         00534250
| *                                                               *         00541240
| *                                                               *         00548230
| *                                                               *         00555220
| *                                                               *         00562210
| *                                                               *         00569200
| *-Z-------------------------------------------------------------*         00576190
| AP2TIOPT CSECT ,                                                        00640000
|          SPACE 2                                                        00650000
| ***************************************************************         00660000
| *    THIS SECTION OF THE INSTALLATION OPTIONS SELECTS THE    *          00670000
| *    AUXILIARY PROCESSORS, AND WORKSPACE LIBRARY NAMING      *          00680000
| *    CONVENTIONS USED BY APL2 FOR TSO.                       *          00690000
| *    DEFAULTS AND MINIMUM VALUES FOR APL2 STORAGE AREAS      *          00700000
| *    ARE ALSO ESTABLISHED.   NEW WORKSPACES DCB VALUES ARE   *          00710000
| *    ESTABLISHED HERE, AS WELL AS A DEFAULT UNITNAME AND     *          00720000
| *    VOLSER.   THESE VALUES MAY BE OVER-RIDDEN BY THE        *          00730000
| *    INSTALLATION EXIT AT ANY TIME.                          *          00740000
| *                                                            *          00750000
| *    THE DEFAULT VALUES CHOSEN ARE REASONABLE FOR AN MVS/TSO *          00760000
| *    INSTALLATION.                                           *          00770000
| *                                                            *          00771000
| *    NOTE: TSO DATA SET NAME QUALIFIERS ARE LIMITED TO EIGHT *          00772000
| *    CHARACTERS. SINCE THE LIBRARY NUMBER OF PUBLIC AND      *          00773000
```

```
| *    PROJECT LIBRARIES ARE INCLUDED IN THE INTERMEDIATE      *          00774000
| *    QUALIFIER, THE LENGTH OF THE APLID PARAMETER PLUS THE   *          00775000
| *    LARGEST USED LIBRARY NUMBER SHOULD ADD UP TO EIGHT OR   *          00776000
| *    LESS. AN ASSEMBLY ERROR IS GENERATED IF THE LENGTH OF   *          00777000
| *    APLID IS GREATER THAN 7.                                *          00778000
| ************************************************************          00780000
|          SPACE 2                                                       00790000
|          AP2TITOP                                                     +00806990
|                APLID=V,            WORKSPACE INTERMEDIATE QUALIFIER   +00813980
|                BLKSIZE=11120,      DEFAULT BLKSIZE FOR NEW WORKSPACE  +00821960
|                ,     NOTE: PREVIOUSLY 4240.  11120 MEANS MUCH FASTER  +00822950
|                ,           I/O, BUT 34K INCREASE IN FREESIZE USAGE.   +00823940
|                CSVPID=CSVP,        SUBSYSTEM NAME FOR GLOBAL SVP      +00827960
|                DEFAULT=(DEFAULTA,DEFAULTZ), DEFAULT PARAM LIST        +00834950
|                INAME=AP2INTRP,     INTERPRETER ENTRY POINT            +00841940
|                LIBKEEP=YES,        RETAIN LIBRARY OWNERSHIP           +00848930
|                LIBQLFR=APL2,       SHARABLE LIBRARY QLFR              +00855920
|                LIBSER=,            DEFAULT VOLSER FOR NEW WS          +00862910
|                LIBUNIT=,           DEFAULT UNITNAME FOR NEW WS        +00869900
|                OVERIDE=(OVERRIDA,OVERRIDZ), OVERRIDE PARAM LIST       +00876890
|                PBLIBMX=999,        SET MAXIMUM SAM PUBLIC LIBRARY #   +00883880
|                PUBQLFR=AP2V2R02,   PUBLIC HIGH-LEVEL QLFR             +00895850
|                P10EVSZ=2048,       P. 10 EVALUATION BLOCK SIZE        +00897860
|                QNLT=ENU,           PUT INITIAL NATIONAL LANGUAGE HERE +00904850
|                ,                   OR 'QNLT=,' FOR UPPER CASE ENGLISH +00911840
|                RESAPS=(AP2T100,  SYSTEM COMMAND PROCESSOR             +00932810
|                AP2T101,          ALTERNATE INPUT STACK PROCESSOR      +00939800
|                AP2T102,          MAIN STORAGE ACCESS PROCESSOR        +00946790
|                AP2T111,          QSAM FILE PROCESSOR                  +00953780
|                AP2T123,          VSAM FILE PROCESSOR                  +00960770
|                AP2T210,          BDAM FILE PROCESSOR                  +00974750
|                AP2X120,          SESSION MANAGER COMMAND PROCESSOR    +00981740
|                AP2X121,          APL FILE PROCESSOR                   +00988730
|                AP2X124,          FULLSCREEN PROCESSOR                 +00991730
|                AP2X126)          GDDM PROCESSOR                        00995720
|          SPACE 2                                                       01021000
|          ORG   TOPSVPID            BACK TO DEFINITION OF CSVPID       01022000
|          ENTRY AP2SVPID            GIVE IT AN ENTRY POINT             01023000
| AP2SVPID DS    0X                  TO BE FOUND BY AP2TAPV2            01024000
|          ORG   ,                                                       01025000
|          TITLE 'AP2TIOPT - DEFAULT OPTIONS SETTINGS'                   01034990
| *-----------------------------------------------------------*          01040000
| *        THESE ARE THE DEFAULT SETTINGS FOR THE APL2        *          01051990
| *        INVOCATION OPTIONS.  THEY CAN BE OVERRIDDEN        *          01053980
| *        BY THE USER WHEN INVOKING APL2.                    *          01055970
| *                                                           *          01057960
| *        THE INVOCATION OPTIONS ARE DESCRIBED IN            *          01059950
| *        APL2 PROGRAMMING: SYSTEM SERVICES REFERENCE.       *          01061940
| *-----------------------------------------------------------*          01070000
| DEFAULTA DS    0H                                                      01080000
|          DC    C'AISIZE(4096)'    STACK SPACE, AP 101 & INPUT('...')   01101980
|          DC    C'APNAMES('            USER APNAMES AND PARAMETERS     01106960
|          DC      C'AP2X104,'            COPY PROCESSOR                01108950
|          DC      C'AP2X119(SERVPORT(31415) '  TCP/IP AP               01110140
```

```
|          DC        C'TCPID(TCPIP))'                                    01110430
|          DC      C'AP2X211,'            APL OBJECT FILE AP           01110940
|          DC      C'AP2X127(SSID(DSN) '  SQL PROCESSOR                01113920
|          DC        C'CSPLAN(AP2V2R2C) '                               01116800
|          DC        C'RRPLAN(AP2V2R2R) '                               01117690
|          DC        C'ISOL(RR)))'                                      01118900
|          DC    C'CASE(1)'         DEFAULT LOWER CASE, UNDERBARS OK    01120890
|          DC    C'DATEFORM(ISO)'   DATE FORMAT (US|EUROPE|ISO)         01125900
|          DC    C'DBCS(TRY)'       DOUBLE-BYTE CHARS(TRY|ON|OFF|N)     01128890
|          DC    C'DEBUG(0)'        APPLICATION DEBUGGING FLAGS         01137870
|          DC    C'DSOPEN(*)'       GDDM DEVICE TOKEN                   01143860
| *        DC    C'EXCLUDE(AP126)'  DO NOT START NAMED AUX PROCESSORS   01149850
|          DC    C'FREESIZE(0)'     SPACE SAVED FOR SYSTEM SERVICES     01155840
| *                                 FREESIZE(0) MEANS ALL THAT IS LEFT  01161830
|          DC    C'HILIGHT(OUTPUT)' HILIGHTING (INPUT|OUTPUT|ON|OFF)    01170000
|          DC    C'ID(0)'           USER ID                             01184990
| *        DC    C'INPUT('')LOAD A'')'  INITIAL INPUT LINES             01190000
|          DC    C'PROFILE(DEFAULT)'  SESSION MANAGER PROFILE FILE      01200000
| *        DC    C'QUIET(ON)'       SUPPRESS OUTPUT UNTIL INPUT         01219980
| *        DC    C'RUN(PMF)'        EXTERNAL FUNCTION TO START          01221970
|          DC    C'SHRSIZE(40K)'    SHARED MEMORY SIZE                  01228970
|          DC    C'SMAPL(TRY)'      SESSION MANAGER (TRY|ON|OFF)        01233970
|          DC    C'SVMAX(88)'       MAXIUMUM SIMULTANEOUS SHARED VARBS  01241960
|          DC    C'SYSDEBUG(1)'     SYSTEM DEBUGGING FLAGS              01251940
| *                                 SYSDEBUG(1) MAINTAINS A TRACE TABLE 01253930
|          DC    C'TERMCODE(0)'     TERMINAL CODE                       01257940
|          DC    C'TRACE(-65535)'   TURN OFF ALL TRACE FLAGS            01265930
|          DC    C'WSSIZE(25%)'     WORKSPACE SIZE                      01273920
| *        DC    C'XA(31)'          USE EXTENDED STORAGE                01285900
| DEFAULTZ EQU   *-1                                                    01290000
|          TITLE 'AP2TIOPT - OVERRIDING OPTIONS SETTINGS'               01304990
| *-------------------------------------------------------------*       01310000
| *        THESE SETTINGS OVERRIDE THE INVOCATION             *       01320000
| *        PARAMETERS OF THE APL2 COMMAND                     *       01330000
| *-------------------------------------------------------------*       01340000
| OVERRIDA DS    0H                                                     01350000
| *        DC    C'APNAMES(U(A))'   LIST OF USER APNAMES AND PARAMETERS 01364990
| *        DC    C'CASE(1)'         CASE                                01369980
| *        DC    C'DATEFORM(US)'    DATE FORMAT (US|EUROPE|ISO)         01374970
| *        DC    C'DBCS(OFF)'       DOUBLE-BYTE CHARS(TRY|ON|OFF|N)     01379960
| *        DC    C'DEBUG(-255)'     TURN OFF ALL DEBUG FLAGS            01384950
| *        DC    C'DSOPEN()'        DSOPEN DEVICE TOKEN                 01389940
| *        DC    C'EXCLUDE(AP100)'  DO NOT START NAMED AUX PROCESSORS   01400000
| *        DC    C'FREESIZE(128K)'  DO NOT START UNLESS THIS AMT AVAIL  01410000
| *        DC    C'HILIGHT(INPUT)'  HILIGHTING (INPUT|OUTPUT|ON|OFF)    01420000
| *        DC    C'ID(1001)'        USER ID                             01434990
| *        DC    C'INPUT('')LOAD A'')'  INITIAL INPUT LINES             01440000
| *        DC    C'PROFILE(DEFAULT)'  SESSION MANAGER PROFILE DATASET   01450000
| *        DC    C'QUIET(ON)'       NO OUTPUT UNTIL FIRST INPUT         01469980
| *        DC    C'RUN(PMF)'        EXTERNAL FUNCTION TO START          01471970
| *        DC    C'SHRSIZE(48K)'    SHARED MEMORY SIZE                  01475980
| *        DC    C'SMAPL(TRY)'      SESSION MANAGER (TRY|ON|OFF)        01483970
| *        DC    C'SVMAX(32)'       MAXIUMUM SIMULTANEOUS SHARED VARBS  01491960
| *        DC    C'SYSDEBUG(-255)'  TURN OFF ALL SYSDEBUG FLAGS         01500000
```

```
*        DC    C'TERMCODE(32791)' TERMINAL CODE                          01510000
*        DC    C'TRACE(-65535)'   TURN OFF ALL TRACE FLAGS               01524990
*        DC    C'WSSIZE(600K)'    WORKSPACE SIZE                         01529980
*        DC    C'XA(31)'          ABOVE-THE-LINE WRKSPC, SHRD MEMORY     01534970
OVERRIDZ EQU   *-1                                                       01540000
         TITLE 'AP2TIOPT -- DEFINITION OF APL USER DATA'                 01934990
************************************************************             01940000
*   THIS SECTION OF THE INSTALLATION OPTIONS DEFINES THE     *           01956990
*   FIXED PORTION OF DATA TO BE RETURNED TO THE APL          *           01963980
*   APPLICATION THROUGH THE AP 100 COMMAND:                  *           01970970
*        APL USER                                            *           01980000
*   SEE 'APL2 PROGRAMMING: SYSTEM SERVICES REFERENCE',       *           01983000
*   SH21-1054, FOR MORE DETAILS.                             *           01987990
*                                                            *           01990000
*   A NUMBER OF ADDITIONAL FIELDS ARE RETURNED BY APL USER,  *           02009990
*   BUT THEIR CONTENT IS DETERMINED DYNAMICALLY BY APL2.     *           02019980
*                                                            *           02029970
*   NO PROCESSING DECISIONS ARE MADE IN APL2 BASED ON THE    *           02039960
*   VALUES DEFINED BELOW  THEY ARE INFORMATIONAL DATA FOR    *           02049950
*   YOUR APL USERS.  IF APL APPLICATIONS ARE WRITTEN TO      *           02059940
*   DEPEND ON VALID ENTRIES MADE IN THESE FIELDS, THEN YOU   *           02069930
*   MUST MAINTAIN THIS DATA BY CHANGING THE VALUES TO MATCH  *           02079920
*   YOUR EXISTING CONFIGURATION AND RECOMPILE THIS MODULE.   *           02089910
*                                                            *           02180000
*   ADDITIONAL STATIC INFORMATIONAL FIELDS MAY BE ADDED TO   *           02219990
*   THE 'APL USER' RETURNED DATA BY ADDING ADDITIONAL        *           02249980
*   8-CHARACTER FIELDS BETWEEN LABELS USERLOCA AND USERLOCZ. *           02279970
************************************************************             02310000
         ENTRY USRT               DEFINE DATA FOR APL USER               02350000
USRT   AP2TUST APLN='APL2',       APL NAME                              +02399990
               TPAMN='ACF/VTAM',  TP ACCESS METHOD NAME                  +02439980
               TPAML='2.0',        "              LEVEL                 +02479970
               GDMN='GDDM',       GRAPHIC DATA DISPLAY MANAGER NAME     +02519960
               GDML='V3R1.0',      "                           LEVEL    +02579930
               HSMN='HSM',        HIERARCHICAL STORAGE MANAGER NAME     +02599940
               HSML='2.2.1',       "                           LEVEL    +02639930
               RACN='RACF',       RESOURCE ACCESS CONTROL NAME          +02679920
               INST=(USERLOCA,USERLOCZ)  LABELS FOR LOCAL EXTENSION      02719910
         SPACE 3                                                         02820000
USERLOCA DS    0D                                                        02825000
************************************************************             02830000
*        IF INSTALLATION DATA IS ADDED TO THE "APL USER"   *           02840000
*        COMMAND, IT SHOULD BE DEFINED AT THIS POINT.      *           02855990
*        NOTE THAT IT SHOULD BE A MULTIPLE OF 8 BYTES.     *           02861980
************************************************************             02870000
*        DC    CL8'SAMPLE'                                               02899990
USERLOCZ DS    0D                                                        02919980
         END                                                             02960000
```

Application Environment Installation Options (AP2TIOPX Option Module)

```
| TIOPX    TITLE 'P-AP2TIOPX: INSTALLATION OPTIONS FOR APL2AE/TSO'        00014990
| *-P-AP2TIOPX-------------------------------------------------*         00020000
| *                                                           *         00030000
| * MODULE-NAME: AP2TIOPX                                     *         00044990
| *                                                           *         00050000
| * DESCRIPTIVE NAME = APL2/AE INSTALLATION OPTIONS: TSO       *         00064990
| *                                                           *         00070000
| * COPYRIGHT:  Licensed Materials - Property of IBM           *         00086990
| *                                                           *         00093980
| *             5688-228, 5688-229                            *         00104960
| *             (C) COPYRIGHT IBM CORP. 1984, 1994            *         00112930
| *                                                           *         00114950
| *             See Copyright Instructions                    *         00121940
| *                                                           *         00128930
| * STATUS:     APL2 VERSION 2 RELEASE 2                      *         00145900
| *                                                           *         00150000
| * FUNCTION:    PERMIT INSTALLATIONS TO SPECIFY PARAMETERS    *         00160000
| *              USED WHEN INVOKING AND USING THE APL2 SUBSET. *         00170000
| *                                                           *         00180000
| * NOTES:                                                    *         00190000
| *                                                           *         00200000
| *   DEPENDENCIES: NONE                                      *         00210000
| *                                                           *         00220000
| *   RESTRICTIONS: TSO ONLY                                  *         00230000
| *                                                           *         00240000
| *   REGISTER-CONVENTIONS: N/A                               *         00250000
| *                                                           *         00260000
| *   PATCH-LABEL: N/A                                        *         00270000
| *                                                           *         00280000
| * MODULE-TYPE: TABLE                                        *         00290000
| *                                                           *         00300000
| *   PROCESSOR: ASSEMBLER H                                  *         00310000
| *                                                           *         00320000
| *   MODULE SIZE: 1K                                         *         00330000
| *                                                           *         00340000
| *   ATTRIBUTES:  RMODE 24                                   *         00350000
| *                                                           *         00360000
| *-----------------------------------------------------------*         00370000
| *                                                           *         00380000
| * ENTRY-POINT: AP2TIOPT                                     *         00390000
| *                                                           *         00400000
| *   PURPOSE:   PROVIDE PROGRAM ACCESS TO LOCAL OPTION VALUES. *         00410000
| *                                                           *         00420000
| *   LINKAGE:   TABLE IS MAPPED BY AP2TITOP MACRO.           *         00430000
| *                                                           *         00440000
| *-----------------------------------------------------------*         00450000
| *                                                           *         00460000
| * INPUT:       N/A                                          *         00470000
| *                                                           *         00480000
| * OUTPUT:      N/A                                          *         00490000
```

```
|  *                                                               *         00500000
|  * EXIT-NORMAL: N/A                                              *         00510000
|  *                                                               *         00520000
|  * EXIT-ERROR:  N/A                                             *         00530000
|  *                                                               *         00540000
|  * EXTERNAL-REFERENCES:                                         *         00550000
|  *                                                               *         00560000
|  *   ROUTINES:  AS DEFINED BY THE AP2TITOP MACRO PARAMETERS.     *         00570000
|  *              MAY INCLUDE:                                     *         00580000
|  *              - AN INSTALLATION EXIT ROUTINE (OPTUSER)         *         00590000
|  *              - RESIDENT V1 AUXILIARY PROCESSORS (RESAPS)      *         00600000
|  *              - RESIDENT V2 PROCESSOR TASKS (ATASKS)           *         00610000
|  *              - THE V1 AUX PROCESSOR INTERFACE (AP2TASVP)      *         00620000
|  *              - THE V2 PROCESSOR INTERFACE (AP2XASRV)          *         00630000
|  *                                                               *         00640000
|  *   DATA-AREAS: NONE                                            *         00650000
|  *                                                               *         00660000
|  *   CONTROL-BLOCKS: TOP, AS DEFINED BY AP2TITOP                 *         00670000
|  *                                                               *         00680000
|  * TABLES:      TOPAPS: RESIDENT V1 AND V2 PROCESSORS            *         00690000
|  *                                                               *         00700000
|  * MACROS:      SEE LIST WHICH FOLLOWS THE ASSEMBLY              *         00710000
|  *                                                               *         00720000
|  * CHANGE-ACTIVITY:                                             *         00730000
|  *                                                               *         00740000
|  *                                                               *         00750000
|  *                                                               *         00760000
|  *                                                               *         00770000
|  *                                                               *         00780000
|  *                                                               *         00790000
|  *-Z-------------------------------------------------------------*         00800000
|  AP2TIOPT CSECT ,                                                         00810000
|           SPACE 2                                                         00820000
|  ***************************************************************         00830000
|  *    THIS SECTION OF THE INSTALLATION OPTIONS SELECTS THE     *         00840000
|  *    AUXILIARY PROCESSORS, AND WORKSPACE LIBRARY NAMING       *         00850000
|  *    CONVENTIONS USED BY APL2 FOR TSO.                        *         00860000
|  *    DEFAULTS AND MINIMUM VALUES FOR APL2 STORAGE AREAS       *         00870000
|  *    ARE ALSO ESTABLISHED.   NEW WORKSPACES DCB VALUES ARE    *         00880000
|  *    ESTABLISHED HERE, AS WELL AS A DEFAULT UNITNAME AND      *         00890000
|  *    VOLSER.   THESE VALUES MAY BE OVER-RIDDEN BY THE         *         00900000
|  *    INSTALLATION EXIT AT ANY TIME.                           *         00910000
|  *                                                             *         00920000
|  *    THE DEFAULT VALUES CHOSEN ARE REASONABLE FOR AN MVS/TSO  *         00930000
|  *    INSTALLATION.                                            *         00940000
|  *                                                             *         00950000
|  *    NOTE: TSO DATA SET NAME QUALIFIERS ARE LIMITED TO EIGHT  *         00960000
|  *    CHARACTERS. SINCE THE LIBRARY NUMBER OF PUBLIC AND       *         00970000
|  *    PROJECT LIBRARIES ARE INCLUDED IN THE INTERMEDIATE       *         00980000
|  *    QUALIFIER, THE LENGTH OF THE APLID PARAMETER PLUS THE    *         00990000
|  *    LARGEST USED LIBRARY NUMBER SHOULD ADD UP TO EIGHT OR    *         01000000
|  *    LESS. AN ASSEMBLY ERROR IS GENERATED IF THE LENGTH OF    *         01010000
|  *    APLID IS GREATER THAN 7.                                 *         01020000
|  ***************************************************************         01030000
```

```
|          SPACE 2                                                      01040000
|          AP2TITOP                                                    +01050000
|               CSVPID=CSVP,        SUBSYSTEM NAME FOR GLOBAL SVP      +01060000
|               DEFAULT=(DEFAULTA,DEFAULTZ), DEFAULT PARAM LIST       +01070000
|               INAME=AP2INTRP,     INTERPRETER ENTRY POINT            +01084990
|               OVERIDE=(OVERRIDA,OVERRIDZ), OVERRIDE PARAM LIST      +01090000
|               P10EVSZ=2048,       P. 10 EVALUATION BLOCK SIZE        +01096000
|               QNLT=ENU,           PUT INITIAL NATIONAL LANGUAGE HERE +01102990
|               ,                   OR 'QNLT=,' FOR UPPER CASE ENGLISH +01107970
|               RESAPS=(AP2T100,  SYSTEM COMMAND PROCESSOR             +01130000
|               AP2T101,          ALTERNATE INPUT STACK PROCESSOR     +01140000
|               AP2T102,          MAIN STORAGE ACCESS PROCESSOR       +01150000
|               AP2T111,          QSAM FILE PROCESSOR                 +01160000
|               AP2T123,          VSAM FILE PROCESSOR                 +01170000
|               AP2T210,          BDAM FILE PROCESSOR                 +01180000
|               AP2X121,          APL FILE PROCESSOR                  +01190000
|               AP2X124,          FULLSCREEN PROCESSOR                +01195000
|               AP2X126)          GDDM PROCESSOR                       01200000
|          SPACE 2                                                      01210000
|          ORG   TOPSVPID           BACK TO DEFINITION OF CSVPID        01220000
|          ENTRY AP2SVPID           GIVE IT AN ENTRY POINT              01230000
| AP2SVPID DS    0X                 TO BE FOUND BY AP2TAPV2             01240000
|          ORG   ,                                                      01250000
|          TITLE 'AP2TIOPX - DEFAULT OPTIONS SETTINGS'                  01264990
| *-------------------------------------------------------------*       01270000
| *        THESE ARE THE DEFAULT SETTINGS FOR THE APL2         *       01281990
| *        INVOCATION OPTIONS.  THEY CAN BE OVERRIDDEN         *       01283980
| *        BY THE USER WHEN INVOKING APL2.                     *       01285970
| *                                                            *       01287960
| *        THE INVOCATION OPTIONS ARE DESCRIBED IN             *       01289950
| *        APL2 PROGRAMMING: SYSTEM SERVICES REFERENCE.        *       01291940
| *-------------------------------------------------------------*       01300000
| DEFAULTA DS    0H                                                     01310000
|          DC    C'AISIZE(4096)'    STACK SPACE, AP 101 & INPUT('...')  01324990
|          DC    C'APNAMES('            USER APNAMES AND PARAMETERS    01334990
|          DC      C'AP2X119(SERVPORT(31415) '  TCP/IP AP              01342260
|          DC        C'TCPID(TCPIP))'                                   01342550
|          DC      C'AP2X211,'            APL OBJECT FILE AP          01342960
|          DC      C'AP2X127(SSID(DSN) '  SQL PROCESSOR                01346960
|          DC        C'CSPLAN(AP2V2R2C) '                             01351940
|          DC        C'RRPLAN(AP2V2R2R) '                             01352930
|          DC        C'ISOL(RR)))'                                    01356940
|          DC    C'CASE(1)'         DEFAULT LOWER CASE, UNDERBARS OK    01360930
|          DC    C'DATEFORM(ISO)'   DATE FORMAT (US|EUROPE|ISO)         01370000
|          DC    C'DBCS(TRY)'       DOUBLE-BYTE CHARS(TRY|ON|OFF|N)    01380000
|          DC    C'DEBUG(0)'        APPLICATION DEBUGGING FLAGS         01390000
|          DC    C'DSOPEN(*)'       GDDM DEVICE TOKEN                   01400000
| *        DC    C'EXCLUDE(AP126)'  DO NOT START NAMED AUX PROCESSORS   01410000
|          DC    C'FREESIZE(0)'     SPACE SAVED FOR SYSTEM SERVICES     01420000
| *                                 FREESIZE(0) MEANS ALL THAT IS LEFT  01430000
|          DC    C'ID(0)'           USER ID                             01440000
| *        DC    C'INPUT('')LOAD A'')'  INITIAL INPUT LINES             01450000
| *        DC    C'QUIET(ON)'       SUPPRESS OUTPUT UNTIL INPUT         01464990
| *        DC    C'RUN(PMF)'        EXTERNAL FUNCTION TO START          01470000
```

```
|          DC    C'SHRSIZE(40K)'    SHARED MEMORY SIZE                    01484990
|          DC    C'SVMAX(88)'       MAXIUMUM SIMULTANEOUS SHARED VARBS    01490000
|          DC    C'SYSDEBUG(1)'     SYSTEM DEBUGGING FLAGS                01500000
| *                                 SYSDEBUG(1) MAINTAINS A TRACE TABLE   01510000
|          DC    C'TRACE(-65535)'   TURN OFF ALL TRACE FLAGS              01520000
|          DC    C'WSSIZE(25%)'     WORKSPACE SIZE                        01530000
| *        DC    C'XA(31)'          USE EXTENDED STORAGE                  01540000
| DEFAULTZ EQU   *-1                                                     01550000
|          TITLE 'AP2TIOPX - OVERRIDING OPTIONS SETTINGS'                01564990
| *-------------------------------------------------------------*         01570000
| *        THESE SETTINGS OVERRIDE THE INVOCATION             *         01580000
| *        PARAMETERS OF THE APL2 COMMAND                     *         01590000
| *-------------------------------------------------------------*         01600000
| OVERRIDA DS    0H                                                      01610000
| *        DC    C'APNAMES(U(A))'   LIST OF USER APNAMES AND PARAMETERS  01620000
| *        DC    C'CASE(1)'         CASE                                 01630000
| *        DC    C'DATEFORM(US)'    DATE FORMAT (US|EUROPE|ISO)          01640000
| *        DC    C'DBCS(OFF)'       DOUBLE-BYTE CHARS(TRY|ON|OFF|N)      01650000
| *        DC    C'DEBUG(-255)'     TURN OFF ALL DEBUG FLAGS             01660000
| *        DC    C'DSOPEN()'        DSOPEN DEVICE TOKEN                  01670000
| *        DC    C'EXCLUDE(AP100)'  DO NOT START NAMED AUX PROCESSORS    01680000
| *        DC    C'FREESIZE(128K)'  DO NOT START UNLESS THIS AMT AVAIL   01690000
| *        DC    C'ID(1001)'        USER ID                              01700000
| *        DC    C'INPUT('')LOAD A'')'  INITIAL INPUT LINES              01710000
| *        DC    C'QUIET(ON)'       NO OUTPUT UNTIL FIRST INPUT          01725990
| *        DC    C'RUN(PMF)'        EXTERNAL FUNCTION TO START           01731980
| *        DC    C'SHRSIZE(48K)'    SHARED MEMORY SIZE                   01740000
| *        DC    C'SVMAX(32)'       MAXIUMUM SIMULTANEOUS SHARED VARBS   01750000
| *        DC    C'SYSDEBUG(-255)'  TURN OFF ALL SYSDEBUG FLAGS          01760000
| *        DC    C'TRACE(-65535)'   TURN OFF ALL TRACE FLAGS             01770000
| *        DC    C'WSSIZE(600K)'    WORKSPACE SIZE                       01780000
| *        DC    C'XA(31)'          ABOVE-THE-LINE WRKSPC, SHRD MEMORY   01790000
| OVERRIDZ EQU   *-1                                                     01800000
|          TITLE 'AP2TIOPX - DEFINITION OF APL USER DATA'                01819990
| ************************************************************          01839990
| *   THIS SECTION OF THE INSTALLATION OPTIONS DEFINES THE     *         01859980
| *   FIXED PORTION OF DATA TO BE RETURNED TO THE APL          *         01879970
| *   APPLICATION THROUGH THE AP 100 COMMAND:                  *         01899960
| *        APL USER                                            *         01919950
| *   SEE 'APL2 PROGRAMMING: SYSTEM SERVICES REFERENCE',       *         01939940
| *   SH21-1054, FOR MORE DETAILS.                            *         01968920
| *                                                            *         01979920
| *   A NUMBER OF ADDITIONAL FIELDS ARE RETURNED BY APL USER,  *         01999910
| *   BUT THEIR CONTENT IS DETERMINED DYNAMICALLY BY APL2.     *         02019900
| *                                                            *         02039890
| *   NO PROCESSING DECISIONS ARE MADE IN APL2 BASED ON THE    *         02059880
| *   VALUES DEFINED BELOW  THEY ARE INFORMATIONAL DATA FOR    *         02079870
| *   YOUR APL USERS.  IF APL APPLICATIONS ARE WRITTEN TO      *         02099860
| *   DEPEND ON VALID ENTRIES MADE IN THESE FIELDS, THEN YOU   *         02119850
| *   MUST MAINTAIN THIS DATA BY CHANGING THE VALUES TO MATCH  *         02139840
| *   YOUR EXISTING CONFIGURATION AND RECOMPILE THIS MODULE.   *         02159830
| *                                                            *         02179820
| *   ADDITIONAL STATIC INFORMATIONAL FIELDS MAY BE ADDED TO   *         02199810
| *   THE 'APL USER' RETURNED DATA BY ADDING ADDITIONAL        *         02219800
```

```
*   8-CHARACTER FIELDS BETWEEN LABELS USERLOCA AND USERLOCZ. *          02239790
************************************************************          02259780
         ENTRY USRT               DEFINE DATA FOR APL USER            02279770
USRT   AP2TUST APLN='APL2AE',     APL NAME                           +02308750
               TPAMN='ACF/VTAM',  TP ACCESS METHOD NAME               +02319750
               TPAML='2.0',        "               LEVEL             +02339740
               GDMN='GDDM',       GRAPHIC DATA DISPLAY MANAGER NAME  +02359730
               GDML='V3R1.0',      "                           LEVEL  +02393700
               HSMN='HSM',        HIERARCHICAL STORAGE MANAGER NAME  +02399710
               HSML='2.2.1',       "                           LEVEL  +02419700
               RACN='RACF',       RESOURCE ACCESS CONTROL NAME       +02439690
               INST=(USERLOCA,USERLOCZ)  LABELS FOR LOCAL EXTENSION    02459680
         SPACE 3                                                       02479670
USERLOCA DS    0D                                                     02499660
************************************************************          02519650
*        IF INSTALLATION DATA IS ADDED TO THE "APL USER"     *         02539640
*        COMMAND, IT SHOULD BE DEFINED AT THIS POINT.        *         02559630
*        NOTE THAT IT SHOULD BE A MULTIPLE OF 8 BYTES.       *         02579620
************************************************************          02599610
*        DC    CL8'SAMPLE'                                            02619600
USERLOCZ DS    0D                                                     02639590
         END                                                          02850000
```

APL2 Initialization Command for *APL2PI* (AP2XAPIC)

```
|  AP2XAPIC TITLE 'P-AP2XAPIC: APL2 Initialization Command for APL2PI'     00010000
|  *-P-AP2XAPIC-------------------------------------------------*         00020000
|  *                                                           *         00030000
|  * MODULE-NAME: AP2XAPIC                                     *         00040000
|  *                                                           *         00050000
|  * DESCRIPTIVE-NAME: APL2 Initialization Command for APL2PI  *         00060000
|  *                                                           *         00070000
|  * COPYRIGHT:   Licensed Materials - Property of IBM         *         00090980
|  *                                                           *         00095980
|  *              5688-228, 5688-229                           *         00111950
|  *              (C) COPYRIGHT IBM CORP. 1988, 1994           *         00114940
|  *                                                           *         00119950
|  *              See Copyright Instructions                   *         00133930
|  *                                                           *         00140000
|  * STATUS:      APL2 VERSION 2 RELEASE 2                     *         00157970
|  *                                                           *         00160000
|  * FUNCTION:    Non-default APL2 initialization command used *         00170000
|  *              by APL2PI.                                   *         00180000
|  *                                                           *         00190000
|  * NOTES:                                                    *         00200000
|  *                                                           *         00210000
|  *   DEPENDENCIES:                                          *         00220000
|  *              Designed to be used in conjunction with APL2PI *         00230000
|  *              (AP2VAPI or AP2TAPI).                        *         00240000
|  *                                                           *         00250000
|  *   RESTRICTIONS:                                          *         00260000
|  *              None.                                        *         00270000
|  *                                                           *         00280000
|  *   REGISTER-CONVENTIONS:                                  *         00290000
|  *              None.                                        *         00300000
|  *                                                           *         00310000
|  *   PATCH-LABEL: None.                                     *         00320000
|  *                                                           *         00330000
|  * MODULE-TYPE: Table.                                       *         00340000
|  *                                                           *         00350000
|  *   PROCESSOR: ASSEMBLER H                                 *         00360000
|  *                                                           *         00370000
|  *   MODULE SIZE: .1K (Design point, not current size)      *         00380000
|  *                                                           *         00390000
|  *   ATTRIBUTES:  REENTRANT, READ-ONLY.                     *         00400000
|  *                                                           *         00410000
|  *-----------------------------------------------------------*         00420000
|  *                                                           *         00430000
|  * ENTRY-POINT: AP2XAPIC                                     *         00440000
|  *                                                           *         00450000
|  *   PURPOSE:   APL2 initialization command for APL2PI.     *         00460000
|  *              SEE ALSO 'FUNCTION' IN THE ENTRY POINT PROLOG. *         00470000
|  *                                                           *         00480000
|  *   LINKAGE:   SEE 'CALL'/'ARGUMENTS' IN ENTRY POINT PROLOG  *         00490000
|  *                                                           *         00500000
|  *-----------------------------------------------------------*         00510000
```

```
|  *                                                               *         00520000
|  * INPUT:       SEE 'GLOBALS' IN THE ENTRY POINT PROLOGS        *         00530000
|  *                                                               *         00540000
|  * OUTPUT:      SEE 'GLOBALS' IN THE ENTRY POINT PROLOGS        *         00550000
|  *                                                               *         00560000
|  * EXIT-NORMAL: SEE 'RESULTS' IN THE ENTRY POINT PROLOGS        *         00570000
|  *                                                               *         00580000
|  * EXIT-ERROR:  SEE 'RESULTS' IN THE ENTRY POINT PROLOGS        *         00590000
|  *                                                               *         00600000
|  * EXTERNAL-REFERENCES:                                         *         00610000
|  *                                                               *         00620000
|  *   ROUTINES:  None.                                            *         00630000
|  *                                                               *         00640000
|  *   DATA-AREAS: None.                                           *         00650000
|  *                                                               *         00660000
|  *   CONTROL-BLOCKS: SEE LIST WHICH FOLLOWS THE ASSEMBLY         *         00670000
|  *                                                               *         00680000
|  * TABLES:      None.                                           *         00690000
|  *                                                               *         00700000
|  * MACROS:      SEE LIST WHICH FOLLOWS THE ASSEMBLY             *         00710000
|  *                                                               *         00720000
|  * CHANGE-ACTIVITY:                                            *         00730000
|  *                                                               *         00740000
|  *                                                               *         00750000
|  *                                                               *         00760000
|  *                                                               *         00770000
|  *                                                               *         00780000
|  *                                                               *         00790000
|  *-Z-------------------------------------------------------------*         00800000
|           TITLE 'A-AP2XAPIC: APL2 Initialization Command for APL2PI'      00810000
|  *-A-AP2XAPIC----------------------------------------------------*         00820000
|  *                                                               *         00830000
|  * ROUTINE:     AP2XAPIC                                        *         00840000
|  *                                                               *         00850000
|  * FUNCTION:    Optional APL2 initialization command used by    *         00860000
|  *              APL2PI (AP2VAPI or AP2TAPI).                     *         00870000
|  *                                                               *         00880000
|  * CALL:        None.                                           *         00890000
|  *                                                               *         00900000
|  * ARGUMENTS:   None.                                           *         00910000
|  *                                                               *         00920000
|  * RESULTS:     None.                                           *         00930000
|  *                                                               *         00940000
|  * DESCRIPTION: This module contains an APL2 initialization     *         00950000
|  *              command designed to be used with APL2PI.         *         00960000
|  *              This module may be modified to tailor the        *         00970000
|  *              command to an installation's or user's           *         00980000
|  *              requirements.   If this module is assembled      *         00990000
|  *              and link edited with APL2PI (ie: AP2VAPI or      *         01000000
|  *              AP2TAPI), APL2PI will use the command in this    *         01010000
|  *              module to invoke APL2.  If this module is        *         01020000
|  *              not link edited with APL2PI, APL2PI will use     *         01030000
|  *              a default command to invoke APL2.                *         01040000
```

```
*                                                               *        01050000
*-Z-------------------------------------------------------------*        01060000
          SPACE 1                                                        01070000
          ENTRY AP2XAPIC                                                 01080000
AP2XAPIC CSECT                                                           01090000
APL2CMD  DS    0F                                                        01100000
          DC    AL2(APL2CMDL)                    COMMAND LENGTH        01110000
          DC    AL2(APL2CMDO-APL2CMDN)           OFFSET TO OPTIONS     01120000
*-------------------------------------------------------------*        01130000
*        To customize the APL2 command, modify the following  *        01140000
*        two Assembler statements.                            *        01150000
*                                                             *        01160000
*        The command name defined by APL2CMDN must be a 9-byte*        01170000
*        character constant.  The command options defined by  *        01180000
*        APL2CMDO may be elided, or can be of any length      *        01190000
*        subject to the restrictions of MVS/TSO or VM/CMS.    *        01200000
*        The options can be separated into several DC         *        01210000
*        statements if necessary.                             *        01220000
*-------------------------------------------------------------*        01230000
APL2CMDN DC    CL9'APL2'                        COMMAND               01240000
APL2CMDO DC    C'QUIET RUN(APL2PI)'             OPTIONS               01250000
*-------------------------------------------------------------*        01260000
*        End of modifiable statements                         *        01270000
*-------------------------------------------------------------*        01280000
APL2CMDL EQU   *-APL2CMD                                                01290000
          SPACE 1                                                        01300000
          AP2TAG AP2XAPIC                                                01310000
          SPACE 1                                                        01320000
          END                                                            01330000
```

Appendix D. APL2 System Options and Invocation Options

The system options and their default values are shown in Figure 16. The invocation options and their default values are shown in Figure 17 on page 150. The invocation options are explained in detail in Chapter 4, "APL2 Invocation and Termination" on page 42.

APL2 System Options

Figure 16 (Page 1 of 2). System Options

Parameter	Used To:	Default
APLID	Specify the middle qualifier for SAM private workspace data set names and the first character of the middle qualifier for SAM project and public workspace data set names. **CAUTION:** **APLID must not be assigned the same value as was assigned for VS APL.**	V
ATASKS	Specify by module name the auxiliary processors to which access is provided. Specify the auxiliary processors written to the APL2 AP interface included in the executor and auxiliary processors load module.	
BLKSIZE	Specify the SAM workspace data set block size, which should be a multiple of 80. Larger values result in faster)LOAD and)SAVE operation, but require more available FREESIZE. The previous default was 4240, which used 21K out of FREESIZE during I/O. The new default uses 55K but runs nearly twice as fast. 15040 or 22800 are the only recommended values for 3380-class DASD if you wish to improve I/O speed even further. 8800, 7200, 6080, 5280, or 4240 should be considered if FREESIZE usage is critical. Installations whose DASD is not compatible with IBM 3380 need to consider the geometries of their devices.	11120 bytes
CSVPID	Specify the MVS subsystem name for the global SVP. (The value for this parameter must be the same as the value for the global SVP startup parameter SSID. MVS limits the value of the parameter to four characters.)	CSVP
DEFAULT	Specify start and end addresses of default options character string.	(DEFAULTA, DEFAULTZ)
LIBKEEP	Specify whether or not project library ownership is retained when all the workspaces in that library are dropped. YES indicates that ownership *is* retained. NO indicates that ownership is *not* retained.	YES
LIBQLFR	Specify the high-level qualifier in catalog entries for SAM project library pointers.	APL2
LIBSER	Specify the volume serial number of the direct access storage on which SAM workspaces are to reside.	
LIBUNIT	Specify the unit type of the volume specified by the LIBSER parameter.	
OVERIDE	Specify start and end addresses of override options character string.	(OVERRIDA, OVERRIDZ)
PBLIBMX	Specify the maximum SAM public library number (from a range of 1 to 32767).	999
PUBQLFR	Specify the high-level qualifier in the identification of SAM public workspace data sets.	AP2V2R02
QNLT	Specify the default national language translation for system commands and messages.	ENU (Mixed-Case English)

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Figure 16 (Page 2 of 2). System Options

Parameter	Used To:	Default
QTZDEC	Specify the fractional portion of the time zone value (⎕*TZ*) (any nonnegative integer, which is treated as a decimal fraction).	0
QTZINT	Specify the integer portion of the time zone value (⎕*TZ*). If -12 ≤ *QTZINT*.*QTZDEC* ≤ 12 APL2 sets ⎕*TZ* to the specified value; otherwise (for example, with the default -13), ⎕*TZ* is computed from the CPU clock and the MVS system clock.	-13
RESAPS	Specify, by module name, the auxiliary processors to which access is provided. Specify the auxiliary processors written to the VS APL AP interface (both those distributed with APL2 and those written by the user) included in the executor and auxiliary processors load module. (Auxiliary processors distributed with APL2 are the default.) The correct execution of the)*HOST*,)*IN*, and)*OUT* commands requires that the names of AP 100 and AP 111 (AP2T100 and AP2T111) must be specified in this parameter value.	AP2T100, AP2T101, AP2T102, AP2T111, AP2T123, AP2T210, AP2X120, AP2X121, AP2X124, AP2X126

APL2 Invocation Options

Figure 17 (Page 1 of 2). Invocation Options

Parameter	Used To:	Default
AISIZE	Specify the number of bytes reserved to hold input lines stacked by the alternate input processor (AP 101).	4096 bytes
APNAMES	Specify the auxiliary processors written to the APL2 AP interface not included in the executor and auxiliary processors load module with which you plan to share. The correct execution of the copy commands ()*COPY*,)*PCOPY*, and)*MCOPY*) requires that the name of AP 104 (AP2X104) be specified in this parameter value.	AP2X104, AP2X119, (SERVPORT(31415) TCPID(TCPIP)), AP2X127, (RRPLAN(AP2V2R2R) CSPLAN(AP2V2R2C) SSID(DSN) ISOL(RR)) AP2X211
CASE	Specify the translation to be applied to the underbarred alphabet.	1
DATEFORM	Specify date and time representation convention.	ISO
DBCS	Indicate whether you want mixed APL2/DBCS support for I/O during your APL2 session.	TRY
DEBUG	Specify normal error recovery actions for debugging purposes. See *APL2/370 Programming: System Services Reference*.	0
DSOPEN	Specify a value to be passed to GDDM (if it is available) on a DSOPEN call.	Null
EXCLUDE	Specify the auxiliary processors that you do not want to use during your session. The correct execution of the copy commands ()*COPY*,)*PCOPY*, and)*MCOPY*), the)*HOST* command, and the)*IN* and)*OUT* commands requires that the names of AP 100, AP 104, and AP 111 (AP2T100, AP2X104, and AP2T111) must *not* be specified in this parameter value.	
FREESIZE	Specify a minimum limit on the amount of virtual storage not used for the active workspace or shared variables.	0
HILIGHT	Specify whether input, output, or both is highlighted on the screen.	OUTPUT
ID	Specify an identifier (default library) number to be associated with the user's APL2 session.	0
INPUT	Specify one or more strings of data to be initially executed by APL2 workspaces.	

Figure 17 (Page 2 of 2). Invocation Options

Parameter	Used To:	Default
LOADLIB	Specify the names of private load libraries from which auxiliary processors, other programs invoked by AP 100 commands, or the APL2 interpreter are to be loaded.	
NLT	Specify the national language to be used. This invocation option can override the installation default.	DEFAULT
PROFILE	Specify the name of the session manager profile to be loaded on invocation.	DEFAULT
QUIET	Prevent APL2 from displaying output until it prompts for input (except for AP 126 output and input).	
RUN	Specify the name of the external function to be initially executed.	
SHRSIZE	Specify the amount of virtual storage to be reserved for shared variables.	40K
SMAPL	Specify whether the session manager is required or must be used during an APL2 session.	TRY
SVMAX	Specify the maximum number of shared variables that can be shared concurrently.	88
SYSDEBUG	Specify special debugging settings for use by system programmers. See *APL2/370 Diagnosis Guide*.	1
TERMCODE	Identify the type of terminal being used.	0
TRACE	Specify special debugging aids for use by system programmers. See *APL2/370 Diagnosis Guide*.	-65535
WSSIZE	Specify the amount of virtual storage to be reserved for your active workspace.	25%
XA	Specify the location of storage obtained for the workspace, local shared memory, etc. above (31) or below (24) the 16-megabyte line.	31

The following list shows the priority of invocation option parameters.

1. OVERRIDE invocation options

   These options override both the DEFAULT and specified invocation options.

2. APL2 invocation options

   These options override the DEFAULT invocation options.

3. DEFAULT invocation options

In the case of the APNAMES invocation option, its subparameters are processed as distinct options, as described in Figure 17 on page 150. In the cases of the DEBUG, SYSDEBUG, and TRACE invocation options, the bits represented by the specified value are processed as distinct options, as described above; that is, the

option DEBUG(3) overridden by the option DEBUG(-2) results in the option DEBUG(1).

Appendix E. APL2 Files and Data Sets

This appendix lists and defines the default files and data sets that are used with the APL2 Licensed Program. In most cases, the default definitions can be modified by the installation or the individual user. Also included in this list are the files and data sets that are defined by the installation or the individual user for using or modifying APL2.

Data Set Names

Name	Description
prefix.APLTF.xxxxxxxxx	The sequential file created when a transfer file is written using the)*IN* and)*OUT* system commands.
prefix.APL2.EDIT	Data set used when a named editor has been specified with the)*EDITOR* system command and nothing was preallocated to FILE(APL2EDIT).
prefix.V.DUMPnnnn[2]	The name of a workspace dump.
APL2.SAP2HELP	National Language translation for help text entries selected by □*NLT*.
APL2.SAP2LANG	National Language translation for messages and command keywords selected by □*NLT*.
APL2.SAP2NICK	IBM-supplied names file for processor 11.
APL2.SAP2PROF	Sample profiles.
prefix.xxx.VSAPLPR	The APL2 session manager profile, where VSAPLPR is the default low-level qualifier.
prefix.V[1].wsname	SAM private workspace.
prefix.V[1]nnnn.wsname	SAM project workspace.
APL2[1].V[1]nnn.wsname	SAM public workspace.

FILE (DD) Names

Name	Description
ADMSYMBL	Used by GDDM.
APLDUMP	Used to request formatted dumps.
APLIN	Contains input statements acceptable to APL2.
APLPRINT	Contains a log of the APL session.
APLTRACE	Destination for formatted trace output.
APL2EDIT	File used when a named editor has been specified with the)*EDITOR* system command.
APL2HELP	National Language translation for help text entries selected by □*NLT*

1 Name can be modified by the installation.

2 DUMPnnnn ignores any Wnnnn file and always uses SAM.

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Name	Description
APL2LANG	National Language translation for messages and command keywords selected by □*NLT*.
APL2PROF	Cross systems shared variable profile.
AP2TN011	A library of NAMES files used by Processor 11 to obtain definitions of interfaces to non-APL programs.
CPYSPILL[3]	Used to store work files created by the)*COPY*,)*MCOPY*, and)*PCOPY* system commands. The file size should be as large as the workspace from which you are copying. For greater efficiency, the space allocation should be in units of cylinders or with the round option.
CPYSWAP[3]	Used to store work files created by the)*COPY*,)*MCOPY*, and)*PCOPY* system commands. The file size is equal to the size of the active workspace. For greater efficiency, the space allocation should be in units of cylinders or with the round option.
APLTF	Used by)*IN*,)*OUT*.
ATF	Used by)*IN*,)*OUT*.
F*nnnn*[4]	Used to specify the file name of the VSAM cluster that identifies a file in a VSAM library; also used for AP 121 files and session manager log files.
LOADLIB	Used to specify one or more MVS private load libraries.
Wnnnn[4]	Used to specify the file name of the VSAM cluster that identifies a workspace in a VSAM library.

Private AP 121 Files

Name	Description
CPYSPILL	Used to store work files created by the)*COPY*,)*MCOPY*, and)*PCOPY* system commands.
CPYSWAP	Used to save active workspace during)*COPY*,)*MCOPY*, and)*PCOPY* operations.

[3] If you have not allocated this file an attempt is made to use the F0 VSAM cluster, but performance suffers.

[4] F0 and W0 are used in preference to **F***userid* and **W***userid*.

Appendix F. Installation Exit Routine

This appendix contains Product-Sensitive Programming Interface and Associated Guidance Information.

Providing an Installation Exit Routine

You may optionally provide an installation exit routine that limits or modifies APL2 product processing of a number of user requests. The exit, if provided, is link-edited with the primary APL2 load module. The default exit name is AP2TIUSR, and a sample exit of that name is supplied with APL2. You may use the sample exit as distributed, modify it to your needs and use it, omit the exit entirely, or replace it with your own exit by providing a new name in the OPTUSER parameter of the AP2TITOP macro in AP2TIOPT.

Note: The Assembler H product (5668-962) is required to assemble the IBM-supplied sample in its current form. See “Step 9–Change the Default APL2 System Options and Installation Exits (Optional)” on page 31 for information about how to specify the assembler to SMP/E.

The installation exit is called during APL2 invocation and termination, system command processing, and AP 100 command processing. On each call an exit type code is provided, as defined in the AP2TUSR macro. 11 different type codes are defined, but there are nearly twice that number of conditions for which the exit routine is entered, since it is normally entered both at the beginning of a service and at its end. This distinction is indicated by passing a complemented type code for the end-of-service calls.

Information provided to the installation exit, and the actions it may take, for each of the 11 type codes is described below. The sample exit routine includes a router that gives control to one of 23 subroutines based on the type of code passed, but your module need not follow that structure.

Interfaces That Apply to Every Call

The module is invoked with a standard BALR 14, 15 type call. It is always called in problem state, user key, 24-bit mode. On entry, register 0 contains the type code, and register 1 points to an interface block defined by the AP2TIXP mapping macro. This appendix provides a description of fields in the interface blocks. Fields that apply to all calls, or a group of calls, are described in general sections before the individual types. Then, fields that apply to specific calls are described with the corresponding type codes.

The exit routine may modify the contents of fields in the interface block, may pass back a return code in register 15, and may return at offset 0 or 4 from the address in register 14 on entry. The meanings of the offset returns and the register return codes are defined in the sections on the individual type codes.

Some installations may have exit routines that were used for earlier releases of APL2 or for VS APL, and that access other APL control blocks. We have attempted to include fields you need in the interface block, and have provided a compatibility mapping macro (AP2TCMS) that retains the field names previously

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used. If you need to access additional fields, IBM recommends that you take the following:

1. All macros provided with APL2 are available in the SMP/E distribution library APL2.AAP2MACS. If a mapping macro used by your exit is not there then it is no longer available for customer use.
2. If required, you may assume that register 10 is pointing to the PTH when your exit routine is entered (see the AP2PTH, AP2XPTX, and AP2TPTT mapping macros). Include the official mapping macros for the control blocks you access in your installation exit routine.
3. Recompile your module now, and for each future APL2 release.
4. Use the Reader's Comment Form at the back of this manual to tell us what fields you need access to.

All fields in the AP2TIXP interface block were renamed for Version 1 Release 3, and those names are used below. For compatibility an AP2TCMS mapping macro is also provided, which expands both the old and new names. You should, however, use the new names where possible. All new names are formed by replacing the (variable) 3-letter prefix of the old names by the prefix IXP.

Common Fields in the Interface Block (AP2TIXP)

IXPUSRWA (use/set) Your exit routine may use this word in any way you want. Typically it is used as a pointer to a storage area obtained by the exit routine. The word contains binary zeros on the first call to the exit routine at APL2 invocation for a user. Its contents are preserved across all subsequent calls for that user until APL2 terminates.

IXPIOPTS (use) Pointer to the installation options module, AP2TIOPT.

IXPPGMF2 (use) A number of termination and error recovery flags. See the AP2TIXP mapping macro for details.

IXPDTYPE (use) Type of terminal. See the AP2TIXP mapping macro for details.

IXPLSTG (use) A copy of the TSO Command Processor Parameter List that was used to start the APL2 session.

IXPMSGP (set) Pointer to an error message to be queued or displayed on return from the exit routine.

IXPMSGL (set) Length of the error message pointed to by IXPERMSG. If the length is positive, the message is displayed immediately. If the length is negative, the message is treated like APL2)*MORE* messages; that is, the message is displayed immediately if DEBUG(1) is in effect, otherwise it is queued, and subsequent messages end with "+".

Interface Block Fields Used for All Library Commands

Note:)*CLEAR* is handled as a special case. See USRCLEAR below.

IXPALIB (use/set) Active workspace library number

IXPANAM (use/set) Active workspace name

IXPAPAS (use/set) Active workspace password

IXPSIZE (use/set) Requested workspace size

IXPLIBNO (use/set) Requested library number

IXPNAME (use/set) Requested workspace name

Note: For historical reasons this field is 11 characters long, but it must never contain more than 8 nonblank characters.

IXPPASS (use/set) Requested password

IXPSRCOD (use/set) For end-of-processing exits only, the return code that is given to the APL2 interpreter

IXPMODE (use) Flag, which is ON if the current request is being applied to a VSAM workspace library.

Interface Block Fields Used Only for SAM Library Commands

These fields are available on library commands only if the IPXMODE flag is OFF.

Note:)*CLEAR* is handled as a special case. See USRCLEAR below.

IXPLOCAL (use/set) A number of library control flags. See the AP2TIXP mapping macro for details.

IXP#LIST (use/set) Pointer to an authorized library list that the exit routine may provide for use in determining what libraries the user should be permitted to)*SAVE* into or)*DROP* from.

Note: This pointer may also be set by the invocation end exit.

The list must consist of fullword pairs, each pair defining one range of authorized library numbers. The first fullword in each pair gives the range's low value. The second fullword in each pair gives the range's high value. The last fullword of the last pair must be complemented to indicate the end of the list.

Examples:

1. Permit creation of all possible project libraries (assuming 999 is defined in the options module as the highest public library number):

```
DC F'1000,-9999999'
```

2. Permit creation of all public and project libraries:

```
DC F'1,-9999999'
```

3. Prohibit creation of any libraries except the user's private library:

```
DC F'1001,-1001'
```

4. Permit creation of a range of public libraries, and two ranges of project libraries:

```
DC F'500,599'
DC F'5000,5999'
DC F'95000,-95999'
```

Note: The inclusion or exclusion of library number 1001 has no effect on the user's ability to create his own private library.

If a user creates a project library, then only that user and any other users having the same PROFILE PREFIX may save into it. If a user creates a public library, however, any other user who is also authorized to create that library may save into it.

IXPPREFL (use/set) Length of the name in IXPPREFX.

IXPPREFX (use/set) High-level qualifier for workspace DSname.

IXPIDL (use) Length of the name in IXPAPLID.

IXPAPLID (use) APLID as provided on AP2TITOP in AP2TIOPT.

IXPPQL (use) Length of the name in IXPPUBQL.

IXPPUBQL (use) PUBQLFR as provided on AP2TITOP in AP2TIOPT.

IXPLQL (use) Length of the name in IXPLIBQL.

IXPLIBQL (use) LIBQLFR as provided on AP2TITOP in AP2TIOPT.

IXPLIBMX (use) PBLIBMX as provided on AP2TITOP in AP2TIOPT.

USRON: APL2 Invocation

These exits are taken near the start and end of APL2 invocation. After return from either exit, execution continues or is aborted depending on the return offset:

R14+4 Normal return, continue with APL2 invocation.
R14+0 Error return, abort APL2 invocation.

If execution is aborted at this time, the following message appears:

```
AP2TINIT803 YOU ARE NOT AUTHORIZED TO USE APL2 FOR TSO
```

IXP Fields at the First Exit

See also the common fields described above.

IXPLSTG Your exit may modify the area pointed to by CPPLCBUF, the first word in the IXPLSTG area. This area contains a copy of the command buffer used to invoke APL2. The copy has already gone through preliminary translation (EBCDIC characters). Because it has not yet been parsed, it can be edited as needed by the user exit for the subsequent parse.

IXPTESTX (set) This word may be pointed to an exit routine that is called by APL2 abend exits any time they are entered. This is designed to let private debugging tools interact with the rather extensive error recovery provided by APL2. The interface supported is rather general, but was defined by Debugging Controller and Extended Debugging Controller © Yale University, marketed by Computer Systems Research, Inc.

APL2 calls the exit routine as if APL2 were MVS calling an ESTAE exit. It expects the exit to indicate retry or percolation by the value in R15 on return to APL2. (See MVS documentation for ESTAE interfaces.) APL2 interprets “retry” to mean that it should proceed with its normal error recovery, whereas “percolate” indicates that APL2 should also percolate the error.

APL2 also makes a “conditional” call to the exit indicated by R0 being negative. This is done before the standard call, and is designed to allow the exit to handle break points through program checks. If the exit returns “retry” (R15=4) from a conditional call, APL2 echoes the retry immediately to MVS.

IXP Fields at the Second Exit

See also the common fields described earlier.

IXPCODE (use) TERMCODE invocation parameter that is in effect for this session.

IXP#LIST (set) This field has been described under SAM library exits above. It may also be set during this invocation exit.

Sample Code in the Supplied Exit

The sample exit contains some disabled code that establishes an interface with the Debugging Controller © Yale University.

It also contains disabled code to provide SAM library authorization ranges based on a list of authorized users statically defined in the module. This code also lets any TSO user who is operator authorized save in any libraries, since it is hard to stop them from doing whatever they want to do anyway.

A more practical exit might read authorization range information from an installation file, such as a SYS1.PARMLIB member. Or it might extract a user group identification from the user ID or from the Protected Step Control Block pointed to by CPPLPSCB.

USRCMD: Preview All APL2 System Commands

Unlike the other exits, this one has only a “start” call. This exit routine is given control whenever an APL2 system command is about to be processed by the interpreter. The exit may inspect, but not modify, the command. It may indicate that the command should be accepted, rejected, or ignored. By asking APL2 to ignore commands, it is possible for the exit routine itself to implement local commands.

Note that if the exit accepts the command, and the system analyzes it as a valid library or APL2 termination command, the appropriate exit calls for that command are then made.

The return offsets and return codes defined are:

R14+4 Normal return, continue with command processing.
R14+0 Abort command processing, with or without error messages.

If the “abort” return is used, register 15 should be set to zero if no error messages are wanted. If register 15 is nonzero, the following actions are taken:

- R15 = 0 - Ignore command.
- R15 = 1 - Ignore command.
- R15 = 2 - The following message appears:

  ```
  AP2TYMSC294 INCORRECT COMMAND+
  ```

- R15 = 3 - APL2 continues processing the command.
- R15 >= 4 - The following message is queued, in addition to any provided by the exit routine:

  ```
  AP2TYMSC401 COMMAND REJECTED BY EXIT
  ```

IXP Fields at the Exit

See also the common fields described earlier.

IXPPARM1 (use) A pointer to a copy of the command, beginning with the command name. The leading ")" and any leading blanks have been eliminated.

IXPPARM2 (use) The length of the character string pointed to by IXPPARM1.

IXPPARM3 (use) An APL2 code number for the command. These numbers are defined in the AP2CMDC macro, and make it easy for your exit to recognize specific commands, no matter what national language they may have been entered in.

If APL2 does not recognize a system command name, it still calls this exit before reporting an error. In this case the code number is -1.

Sample Code in the Supplied Exit

The sample exit contains some disabled code that recognizes when workspaces from a particular library have been loaded, and accepts only)*CLEAR*,)*LOAD*,)*MORE*,)*OFF*, or an interrogative)*WSID*. This could be used to control access to proprietary workspaces.

The sample also contains disabled code used by IBM to trigger testing of an alternative SAM library data set name convention.

USRCMDAP:)HOST and AP 100 Commands, Built-In and TSO

The installation exit is entered first after a command has been passed to AP 100, but before it has been analyzed. Note that)*HOST* also passes commands through AP 100. If the exit routine indicates that execution should continue, it is entered again when the command has completed execution.

This exit may be useful to monitor or restrict usage of certain commands, or to ensure that they are executed in a different environment from the APL2 session.

The two return offsets are distinguished only for the "start" exit. The register 15 return code is ignored for both exits. For the start-of-command exit:

R14+4 Normal return, continue with command processing.
R14+0 Abort command processing, with return code 1.

IXP Fields at the First Exit

See also the common fields described earlier.

IXPPARM1 (use) A pointer to an 8-character field containing the name of the command to be executed, padded with blanks.

IXPPARM2 (use) A pointer to a command buffer in the format defined by TSO, that is:

- Halfword length of the command string
- Halfword offset to the first command parameter
- Character string containing the command

IXP Fields at the Second Exit

See the common fields described earlier.

Sample Code in the Supplied Exit

The sample exit contains disabled code that scans a table of disallowed commands.

USRDSN: SAM Library Data Set Name Generation

These exits allow the installation to override or modify the way that APL2 generates workspace data set names for SAM libraries. It would also be possible to provide exit routine code to do this in the USRDROP, USRLIB, USRLOAD, and USRSAVE exits, but that approach excludes two cases:

1. The search for *CONTINUE* during APL2 invocation.
2. The name generated by the AP 100 APL WSNAME command.

Note: The AP 100 APL LIBS command does not currently call this exit.

The USRSAVE exit does provide capabilities not available here. It can control the volume on which a new data set is placed, and the data set's block size.

See also the USRPROJ exits, which may need to be used in conjunction with USRDSN to support project libraries.

The first exit is entered before a data set name has been generated. It may indicate that standard generation is to proceed, that it is providing a name and the standard procedure should be skipped, or that the process should be terminated with an error.

The second exit is entered after a name has been generated, but only if the first exit requested that the standard procedure be used. This exit may modify the generated name, or may indicate that the process should be terminated with an error.

The return offsets and return codes defined are:

R14+4 Normal return, continue with command processing.
R14+0 Abort processing, or (first exit only) skip generation.

Skip processing is indicated by setting register 15 to 0. If register 15 is nonzero, the operation is aborted. If a library system command is being executed in that case, it is terminated with the return code provided in register 15. The exit should use one of the return codes defined for that command in the AP2RC macro.

IXP Fields at the First Exit

See also the common, common library, and SAM library fields described earlier.

IXPWSDSL (set) Length of the name in IXPWSDSN

IXPWSDSN (set) Workspace data set name

IXP Fields at the Second Exit

See also the common, common library, and SAM library fields described earlier.

IXPWSDSL (use/set) Length of the name in IXPWSDSN

IXPWSDSN (use/set) Workspace data set name

Sample Code in the Supplied Exit

The sample exit contains disabled code that inserts an extra departmental qualifier at the beginning of all generated names. The sample uses a fixed table in which it looks up the user's PROFILE PREFIX to determine the related department numbers. A practical implementation would probably use an algorithm or external table driven by the TSO user ID, or information located through the CPPL.

USRPROJ: SAM Library Project Library Pointers

SAM project libraries have an “owner” that is (usually) the TSO PROFILE PREFIX of the user who first saved a workspace in the library. All workspace data sets in that library are (usually) cataloged under that owner ID. See the USRDSN exits for the exceptions to these rules.

When a user requests access to a SAM project library workspace, APL2 must be able to find the associated data set, given only the library number and workspace name. The standard technique is to use an extra catalog entry, of this form: *libq.vnnn.owner* where “libq” is the LIBQLFR defined in AP2TIOPT, “v” is the APLID defined in the same place, and “nnn” is the library number.

If you do not allow users to create catalog entries of this form, or do not want to support catalog entries without an associated data set, you need to provide alternative support in these exits.

Accessing Workspaces in an Existing Library

The first exit is entered before APL2 has constructed the catalog entry qualifiers that it uses for its search. The exit may elect to proceed with standard processing, to abort completely, or to provide an owner qualifier and request that standard processing be skipped.

If the first exit requests standard processing, APL2 construct the qualifiers it intends to use for its catalog search and return to the second exit. That exit may again elect to proceed (perhaps after modifying the constructed qualifiers), to abort completely, or to provide an owner qualifier and request that standard processing be skipped.

If the second exit requests standard processing, APL2 uses the constructed qualifiers to search the catalog and extract an owner qualifier.

Subsequently, if the USRPROJ exits did not abort processing, the USRDSN exits are entered with information that includes the selected owner as a first qualification level.

Creating and Dropping Libraries

When the first workspace is saved into a project library or when ownership is dropped for a project library after the last workspace has been deleted, the project pointer catalog entry is created or removed, respectively.

The first installation exit may again indicate that the process should proceed, be skipped, or be aborted. If it indicates that the process should be skipped, any owner qualifier that it provides is ignored, but APL2 does not issue a CATALOG or SCRATCH SVC.

If the first exit indicates the process should proceed, APL2 constructs the pointer catalog entry and returns it to the second exit. That exit may again indicate that the process should proceed, be skipped, or be aborted.

Return Offsets and Return Codes

R14+4 Normal return, continue with processing.
R14+0 Skip (R15=0) or abort (R15 nonzero) processing.

In the abort case, the value in register 15 should be one of the values defined in AP2RC as a valid return code from a library command.

IXP Fields at the First Exit

See also the common, common library, and SAM library fields described earlier.

IXPPROJP (use) Pointer to an 8-byte field where an owner qualifier may be returned if the exit specifies the skip return.

IXP Fields at the Second Exit

See also the common, common library, and SAM library fields described earlier.

IXPPROJP (use/set) Length of the catalog entry pointed to by IXPPROJP.

IXPPROJP (use) Pointer to a field that contains a constructed catalog entry. The entry can be updated (with a normal return) or replaced by an owner qualifier (with a skip return).

Sample Code in the Supplied Exit

The sample exit contains disabled code that scans a table of library numbers, returning (via skip option) an owner for each that it finds. The table used is coded as constants within the sample module. In a real installation it would probably be read from a file, or the owner IDs would be derived algorithmically.

The sample also provides an error message for any unrecognized library number. You might instead want to use the standard procedure for unknown libraries.

USROFF:)OFF—APL2 Termination

This exit is entered near the beginning of APL2 termination, and again just before APL2 finally exits to TSO. At the first entry the interpreter task and associated processors have terminated, but the session manager, GDDM, shared variable processor, and auxiliary processors are still running.

The exits may return at either offset +0 or +4, but no particular action is taken based on the offset or return code.

There are no special IXP field usages for these exits. See the common fields described earlier.

Sample Code in the Supplied Exit

The sample exit frees the control block gotten during USRON processing.

USRLOAD:)LOAD,)COPY,)PCOPY,)MCOPY

Under the covers, the three *)COPY* variants also result in a *)LOAD* of the workspace that data is to be copied from. That is why all four system commands produce the same installation exit calls. The three *)COPY* cases can be distinguished from a true *)LOAD* by the IXPSORC flag. The *)MCOPY* case can be further distinguished by the IXPVSCOP flag. The only way for the exit to discriminate between *)COPY* and *)PCOPY* would be for the earlier USRCMD exit to pass on that information.

These exits are also called during invocation if the *CONTINUE* workspace is loaded automatically. This case can be distinguished by the IXPAUTO flag.

For all of the cases just discussed except *)MCOPY* the workspace being loaded may exist in either a SAM data set or a VSAM library. *)MCOPY* is always from SAM, since there was no VSAM support in VS APL. The IXPMODE flag is on if VSAM is being used.

The first exit is called before loading the workspace, the second after the workspace has been loaded. The data set to be accessed (SAM or VSAM) will have been identified before entering the first exit. For a SAM workspace, the USRDSN and (if appropriate) USRPROJ exits are entered during this identification. Either the first or second exit may request that execution be restarted with the data set identification phase. The exit may have modified the library number, or (for VSAM) changed the DDNAME allocation, or (for SAM) modified other qualifiers that are used in constructing the data set name.

Note: It is possible to switch from VSAM to SAM support by changing the library number or freeing the VSAM DDNAME and then requesting restart. The exit cannot, however, cause a switch from SAM to VSAM processing.

Either exit may also request that processing be aborted, with a specified return code. The return code should be one of those defined by the AP2RC macro.

The return offsets and return codes defined are:

R14+4 Normal return, continue with command processing.
R14+0 Restart (R15=0) or abort (R15 nonzero) command processing.

IXP Fields at Both Exits

See also the common, common library, and SAM library fields described earlier. SAM library fields are not valid, of course, if IXPMODE is set.

IXPWSDSL (use/set) Length of the name in IXPWSDSN

IXPWSDSN (use/set) Workspace data set name (SAM)

Note: For VSAM the first 8 bytes of IXPWSDSN contains a DDNAME that was generated from the library number. APL2 ignores any changes to this name or to IXPWSDSL.

IXPVSCOP (use) On if loading a VS APL workspace for *)MCOPY*

IXPSORC (use) On if loading for *)COPY*, *)PCOPY*, or *)MCOPY*

IXPAUTO (use) On if loading *CONTINUE* during invocation

IXP Fields at the Second Exit

See also the common, common library, and SAM library fields described earlier.

IXPSRCOD (use) The return code provided by the library system.

Sample Code in the Supplied Exit

The sample exit contains disabled code that checks for two specific libraries:

- One is presumed to contain workspaces that can be executed, but not inspected.
- The other is presumed to contain workspaces that can be used freely, but not copied.

The sample code prevents)*COPY* type operations for these libraries, and sets or resets flags checked by disabled code in other exits.

USRSAVE:)SAVE and)CONTINUE

There are four conditions that lead to a workspace being saved:

1. A)*SAVE* command issued as a part of the session input.
2. A)*CONTINUE* command issued to terminate the session.
3. A *CONTINUE* workspace saved during forced termination.
4. A *DUMPnnnn* workspace saved when an inconsistency is detected in the active workspace.

The USRSAVE exits are called in all of these cases. For the first two, the USRCMD exit will have just been entered with a CSAVE or CCONTINU indication. For the second and third case, the PD2AUTO flag is set. Thus each of the four cases can be discriminated.

The first exit is called before saving the workspace, the second after the workspace has been saved. The data set to be accessed (SAM or VSAM) will have been identified before entering the first exit. For a SAM workspace, the USRDSN and (if appropriate) USRPROJ exits are entered during this identification. Either the first or second exit may request that execution be restarted with the data set identification phase. The exit may have modified the library number, or (for VSAM) changed the DDNAME allocation, or (for SAM) modified other qualifiers that are used in constructing the data set name.

Note: It is possible to switch from VSAM to SAM support by changing the library number or freeing the VSAM DDNAME and then requesting restart. The exit cannot, however, cause a switch from SAM to VSAM processing.

Either exit may also request that processing be aborted, with a specified return code. The return code should be one of those defined by the AP2RC macro.

The return offsets and return codes defined are:

R14+4 Normal return, continue with command processing.
R14+0 Abort (R15 nonzero) or retry (R15=0) command processing.

IXP Fields for SAM Library Calls:

See also the common, common library, and SAM library fields described earlier.

IXPBLKSI (use/set) DCB BLKSIZE for ALLOCATE command

IXPLUNIT (use/set) UNIT type for ALLOCATE command

IXPLSER (use/set) Volume serial for ALLOCATE command

IXPAUTO (use) On if *CONTINUE* is being saved automatically

IXPWSDSL (use/set) Length of the name in IXPWSDSN

IXPWSDSN (use/set) Workspace data set name

IXPSRCOD (use/set) 2nd call: Library system return code

IXPAUTH (use/set) On if user not authorized to save workspace

IXPOURS (use/set) On if the workspace belongs to this user

IXP Fields for VSAM Library Calls:

See also the common and common library fields described earlier.

IXPAUTO (use) On if *CONTINUE* is being saved automatically

IXPWSDSN (use) DDNAME generated from library number

IXPSRCOD (use/set) 2nd call: Library system return code

Sample Code in the Supplied Exit

The sample exit contains disabled code that prevents any saving of workspaces that are not to be inspected or copied.

USRDROP:)DROP

This routine is given control both before and after deleting a workspace by use of the)*DROP* command.

For SAM project libraries, the library ownership record may be either kept or discarded when the last workspace in a library is dropped. This choice is normally made by the LIBKEEP parameter of the AP2TITOP macro expansion in AP2TIOPT. It may be overridden by setting the IXPDLTX flag in the first USRDROP exit.

The first exit is called before dropping the workspace, the second after the workspace has been dropped. The data set to be accessed (SAM or VSAM) will have been identified before entering the first exit. For a SAM workspace, the USRDSN and (if appropriate) USRPROJ exits are entered during this identification. Either the first or second exit may request that execution be restarted with the data set identification phase. The exit may have modified the library number, or (for VSAM) changed the DDNAME allocation, or (for SAM) modified other qualifiers that are used in constructing the data set name.

Note: It is possible to switch from VSAM to SAM support by changing the library number or freeing the VSAM DDNAME and then requesting restart. The exit cannot, however, cause a switch from SAM to VSAM processing.

Either exit may also request that processing be aborted, with a specified return code. The return code should be one of those defined by the AP2RC macro.

The return offsets and return codes defined are:

R14+4 Normal return, continue with command processing.
R14+0 Abort (R15 nonzero) or retry (R15=0) command processing.

IXP Fields for SAM Library Calls:

See also the common, common library, and SAM library fields described earlier.

IXPWSDSL (use/set) Length of the name in IXPWSDSN

IXPWSDSN (use/set) Workspace data set name

IXPDLTX (use/set) Project lib kept when last WS dropped

IXPSRCOD (use/set) 2nd call: Library system return code

IXPAUTH (use/set) On if user not authorized to drop workspace

IXPOURS (use/set) On if the workspace belongs to this user

IXP Fields for VSAM Library Calls:

See also the common and common library fields described earlier.

IXPWSDSN (use) DDNAME generated from library number

IXPSRCOD (use/set) 2nd call: Library system return code

Sample Code in the Supplied Exit

The sample exit contains disabled code that prevents any deletion of workspaces that are to be executed only, without inspection.

USRLIB:)LIB

The *)LIB* command is handled in an iterative fashion by the library system. Note that the command syntax permits a starting name and ending name in the library. This format is used internally (starting at lowest possible and ending at highest possible) even if not specified by the user. The library system is called with a result buffer of limited size. It fits data into that buffer beginning with the first workspace found at or beyond the starting name, and continuing until the buffer is full or the ending name has been passed. That (perhaps partial) data is then returned to the interpreter, which reissues the request as needed with an updated starting name.

The USRLIB exits are entered at the beginning and end of each iteration. The only information currently provided on search ranges is IXPNAME, which contains the starting name at the first exit, and a “next” starting name at the second exit. Note that IXPSRCOD contains 1 (RCLIBBUF) when partial data is being returned.

For SAM libraries, IXPWSDSN contains a data set name fragment that is used as a search argument. The search argument is used afresh on each of the iterative calls, and the starting and ending names are then applied to select from the catalog information returned.

The return offsets and return codes defined are:

R14+4 Normal return, continue with command processing.
R14+0 Abort (R15 nonzero) or retry (R15=0) command processing.

Note: An abort with R15=1 causes the interpreter to reissue the request immediately with the IXPNAME contents as a beginning name.

IXP Fields for SAM Library Calls:

See also the common, common library, and SAM library fields described earlier.

IXPWSDSL (use/set) Length of the library search argument

IXPWSDSN (use/set) Library search argument (qualifiers)

IXPSRCOD (use/set) 2nd call: Library system return code

IXP Fields for VSAM Library Calls:

See also the common and common library fields described earlier.

IXPWSDSN (use) DDNAME generated from library number

IXPSRCOD (use/set) 2nd call: Library system return code

Sample Code in the Supplied Exit

The sample does not contain any special code.

USRCLEAR:)CLEAR

The first exit may prevent the workspace from being cleared, or specify a size to be used for the *CLEAR* workspace. Either exit may provide additional messages. Here are details on the system response to error returns:

- The initial exit can say either retry (R15=0) or abort. Either way it can provide a message to display or queue. Using retry lets it provide as many messages as it wants. Ultimately it must either abort or return (+4) to continue with the *CLEAR* operation.
- The final exit cannot abort (the *CLEAR* has already happened) and it is not permitted to retry. It is allowed to set the final return code, (either zero or nonzero), and to provide one more message. But it must exit (+0) for either of these features. If it exits (+4) the final return code is automatically set to zero.
- If the final return code is nonzero (due to final exit, or initial exit abort) an additional message is queued indicating that the exit has failed the *CLEAR*.

  The return offsets and return codes defined are:

  R14+4 Normal return, continue with command processing.
  R14+0 Abort (R15 nonzero) or retry (R15=0) command processing.

IXP Fields at the First Exit

IXPSIZE (use/set) Size of the *CLEAR* workspace.

IXPALIB (use) Active workspace library number before *CLEAR*.

IXPANAM (use) Active workspace name before *CLEAR*.

IXPAWSP (use) Active workspace password before *CLEAR*.

IXP Fields at the Second Exit

IXPSIZE (use) Size of the *CLEAR* workspace.

Sample Code in the Supplied Exit

The sample exit contains disabled code that resets any restrictions on inspecting or copying the active workspace.

Sample Installation Exit

```
| TIUSR    TITLE 'AP2TIUSR: SAMPLE INSTALLATION EXIT'                    00022980
| *-------------------------------------------------------------*        00027970
| *                                                             *        00033970
| * COPYRIGHT:  Licensed Materials - Property of IBM            *        00045640
| *                                                             *        00046330
| *             5688-228, 5688-229                              *        00047410
| *             (C) COPYRIGHT IBM CORP. 1984, 1994              *        00048180
| *                                                             *        00048400
| *             See Copyright Instructions                      *        00049090
| *                                                             *        00049950
| * CAUTION:    This module is not covered by IBM Service       *        00075920
| *             Agreements.  It is distributed with APL2        *        00083910
| *             as a sample installation exit. Customers        *        00091900
| *             may modify it as desired, but must meet the     *        00099890
| *             interfaces defined in SH21-1055, "APL2          *        00110870
| *             Installation and Customization under TSO".      *        00115870
| *                                                             *        00127870
| *-------------------------------------------------------------*        00137860
|          LCLB  &CMDCHK,&DBC,&LDONLY,&LIBRANG,&SAMDSN,&XXCMDS          00157840
| *                                                                      00167830
| *              THIS MODULE CONTAINS SOME SAMPLE ROUTINES THAT ARE NOT  00177820
| *              COMPILED UNLESS THE SETB FLAGS LISTED BELOW ARE SET ON. 00187810
| *              DELETE THE * IN COLUMN 1 TO COMPILE THE CORRESPONDING   00197800
| *              ROUTINE.                                                00207790
| *                                                                      00217780
| *&CMDCHK  SETB  1              LOCAL SYSTEM COMMANDS                   00227770
| *&DBC     SETB  1              WORK WITH A DEBUGGING TOOL              00237760
| *&LDONLY  SETB  1              LOAD-ONLY WORKSPACES                    00247750
| *&LIBRANG SETB  1              SAM LIB AUTHORIZATION CONTROL           00257740
| *&SAMDSN  SETB  1              SAM LIBS WITH LOCAL NAME QUALIFIERS     00267730
| *&XXCMDS  SETB  1              RESTRICTED TSO COMMANDS                 00277720
|          MACRO                                                         00318480
| &L       QUEUE &MSG                                                    00319280
| .*-------------------------------------------------------------*        00320080
| .*-------------------------------------------------------------*        00321680
| &L       LA    R14,&MSG                                                00322480
|          ST    R14,IXPMSGP                                             00323280
|          LA    R14,L'&MSG                                              00324080
|          LNR   R14,R14                                                 00324880
|          ST    R14,IXPMSGL                                             00325680
|          MEND                                                          00326480
|          MACRO ,    NOTE: THIS MACRO IS PART OF LIBRANG SAMPLE         00327670
| &LBL     USERL &N                                                      00337660
| .*-------------------------------------------------------------*        00347650
| .*-------------------------------------------------------------*        00367630
|          LCLA  &A,&L               COUNTER FOR NUMBER OF LIBS          00377620
| &A       SETA  (N'&SYSLIST)-1      NUMBER OF LIBRARIES                 00387610
| &L       SETA  8*&A                2 WORDS PER RANGE                   00397600
| &A       SETA  1                   START WITH SYSLST 2                 00407590
|          AIF   ('&N' EQ '').BATCH                                      00417580
| &LBL     DC    CL8'&N.'            USER NAME                           00427570
```

```
|          AGO   .NOTBTCH                                                  00437560
| .BATCH   ANOP                                                            00447550
| &LBL     DC    CL8' '              USER NAME FOR BATCH JOBS            00457540
| .NOTBTCH ANOP                                                            00467530
| .LP      ANOP                                                            00477520
| &A       SETA  &A+1                                                     00487510
|          AIF   ('&SYSLIST(&A,1)' EQ '').END                             00497500
|          AIF   (N'&SYSLIST(&A) EQ  1).SINGLE                           00507490
|          AIF   (N'&SYSLIST(&A) EQ  2).RANGE                            00517480
|          MNOTE 12,'ERROR IN PARAMETER  &SYSLIST(&A) '                  00527470
|          AGO   .LP                                                      00537460
| .SINGLE  ANOP  SINGLE LIBRARY NUMBER                                     00547450
|          DC    F'0               END OF RANGE (OR NUMBER OF)          00557440
|          DC    F'&SYSLIST(&A,1).'  LIBRARY START OF RANGE              00567430
| &L       SETA  &SYSLIST(&A,1)      LAST LIBRARY IN RANGE                00577420
|          AGO   .LP                                                      00587410
| .RANGE   ANOP  RANGE OF LIBRARY NUMBERS                                  00597400
|          DC    F'&L.'              END OF RANGE (OR NUMBER OF)          00607390
|          DC    F'&SYSLIST(&A,1).'  START OF RANGE                       00617380
| &L       SETA  &SYSLIST(&A,2)      END OF RANGE                         00627370
|          AGO   .LP                                                      00637360
| .END     ANOP  PUT OUT LAST OF RANGE                                     00647350
|          DC    F'-&L.'             END OF RANGE                         00657340
|          MEND                                                           00667330
| AP2TIUSR CSECT ,                                                        00677320
| *                                                                       00687310
| ***           MAP APL2 EQUS AND CONTROL BLOCKS WE MAY NEED              00697300
| *                                                                       00707290
|          COPY AP2CMDC           SYSTEM COMMAND CODES                   00717280
|       AP2RC    ,                RETURN CODES TO INTERPRETER            00727270
|       AP2TUSR  ,                INSTALLATION EXIT TYPE CODES           00737260
|       AP2PTH   ,                PRIMARY APL EXECUTOR BLOCK             00747250
|       AP2XPTX  ,                (DITTO CONTINUED)                      00757240
|       AP2TIXP ,                                                        00776220
|          TITLE 'P-AP2TIUSR: LOCAL REGISTER AND DATA DEFINITIONS'        00787210
| R0       EQU   0                                                        00797200
| R1       EQU   1                                                        00807190
| R2       EQU   2                                                        00817180
| R3       EQU   3                                                        00827170
| R4       EQU   4                                                        00837160
| R5       EQU   5                                                        00847150
| R6       EQU   6                                                        00857140
| *                                                                       00867130
| R10      EQU   10                                                       00877120
| R11      EQU   11                                                       00887110
| R12      EQU   12                                                       00897100
| R13      EQU   13                                                       00907090
| R14      EQU   14                                                       00917080
| R15      EQU   15                                                       00927070
| *                                                                       00937060
| *             WORK AREA (KEPT ACROSS CALLS)                             00947050
| *                                                                       00957040
| DSA      DSECT ,                                                        00967030
| *--------------REGISTER SAVE AREA----------------------------          00977020
```

```
| DSAWD1   DS    A                  WORD 1                                01680000
| DSAHSA   DS    A                  HIGHER SAVE AREA POINTER              01690000
| DSALSA   DS    A                  LOWER SAVE AREA POINTER               01700000
| DSARET   DS    A                  R14 (RETURN ADDRESS)                  01710000
| DSAEP    DS    A                  R15 (ENTRY POINT)                     01720000
| DSAR0    DS    F                  R0                                    01759990
| DSAR1    DS    12F                R1 - R12                              01789980
|          AIF   (NOT &LIBRANG).DSALR                                     01819970
| *                                                                      01849960
| *--------------SAM LIB AUTHORIZATION------------------------           01879950
| LIBRANG1 DS    2F                 LIBRARY RANGE 1                       01920000
| .DSALR   AIF   (NOT &LDONLY).DSALO                                     01969990
| *                                                                      02009980
| *--------------LOAD-ONLY  WORKSPACE DATA--------------------           02049970
| USRWSA#  DS    F                  ACTIVE WORKSPACE LIBRARY              02120000
| USRWSAN  DS    CL8                ACTIVE WORKSPACE NAME                 02130000
| *                                                                      02144990
| USRWSP#1 DS    F                  COPIED PUBLIC WORKSPACE #             02150000
| USRWSPN1 DS    CL8                COPIED PUBLIC WORKSPACE NAME          02160000
| *                                                                      02174990
| USRWSP#2 DS    F                  COPIED PUBLIC WORKSPACE #             02180000
| USRWSPN2 DS    CL8                COPIED PUBLIC WORKSPACE NAME          02190000
| *                                                                      02204990
| USRWSP#3 DS    F                  COPIED PUBLIC WORKSPACE #             02210000
| USRWSPN3 DS    CL8                COPIED PUBLIC WORKSPACE NAME          02220000
| *                                                                      02234990
| USRWSP#4 DS    F                  COPIED PUBLIC WORKSPACE #             02240000
| USRWSPN4 DS    CL8                COPIED PUBLIC WORKSPACE NAME          02250000
| *                                                                      02261990
| USRSTEP  EQU   USRWSP#2-USRWSP#1  LENGTH OF AN ENTRY IN THE PUBLIC      02263980
| *                                 WORKSPACE TABLE                      02265970
| USRFLAGS DS    X                  PROCESS FLAGS                         02270000
| USRLOADO EQU   B'10000000'        LOAD-ONLY LIBRARY                     02289990
| USRNOSAV EQU   B'01000000'        CAN'T SAVE NO SAVE LIBRARY FILES      02299980
| *                                                                      02309970
| USRCPYWS EQU   *-USRWSP#1         LENGTH OF AREA                        02350000
| .DSALO   AIF   (NOT &SAMDSN).DSASD                                     02360590
| *                                                                      02361180
| *--------------SAM LIB LOCAL DATASET NAMING-----------------           02361770
| SAMNAME  DS    X                  SAM LIBRARY DSNAME NAMING CONVENTION  02362400
| *                                 01=STANDARD, 02=SPECIAL               02363790
| USERID   DS    CL8               FIRST QUALIFIER IN DSN PASSED TO US    02364780
| NEWNAME  DS    CL(L'IXPWSDSN)     NEW DSNAME BUILT HERE                 02366160
| .DSASD   ANOP                                                          02366760
| DSALEN   EQU   *-DSA              DSA LENGTH                            02370000
|          TITLE 'AP2TIUSR: SETUP AND ROUTER'                            02444980
| *-------------------------------------------------------*              02504970
| *  START OF EXECUTABLE CODE: SETUP AND ROUTER          *              02564960
| *-------------------------------------------------------*              02624950
| AP2TIUSR CSECT ,                                                       02720000
|          STM   R14,R12,DSARET-DSA(R13) SAVE REGISTERS                  02740000
|          LR    R12,R15            LOAD BASE REGISTER                  02760000
|          USING AP2TIUSR,R12       DECLARE BASE                        02770000
|          USING PTH,R10            EXIT PASSES GLOBAL POINTER          02819990
```

```
|          LR    R11,R1              POINT R11 TO IXP                    02869990
|          USING IXP,R11                                                 02874980
|          L     R1,IXPUSRWA         ADDRESS OF USER WORK AREA           02886990
|          LTR   R1,R1               DO WE HAVE ONE?                     02894990
|          BNZ   USER01              .YES - GO AHEAD                     02900000
|  *                                                                     02919990
|  ***           INITIAL ENTRY. GET A USER EXIT WORK AREA.               02929980
|  *                                                                     02939970
|          LA    R0,DSALEN           GET DSA LENGTH                      02949960
|          GETMAIN R,LV=(0)                                              02959950
|          ST    R1,IXPUSRWA         SAVE ADDRESS OF WORK AREA           03009990
|          LR    R2,R1               ADDRESS OF AREA                     03020000
|          LA    R3,DSALEN           LENGTH OF AREA                      03030000
|          SR    R5,R5               CLEAR AREA TO NULLS                 03040000
|          MVCL  R2,R4                ON THE MOVE                        03050000
|  USER01  DS    0H                                                      03062990
|  *                                                                     03065980
|  ***           CHAIN SAVE AREAS                                        03068970
|  *                                                                     03071960
|          ST    R1,DSALSA-DSA(,R13) FORWARD CHAIN IT                    03074950
|          ST    R13,DSAHSA-DSA(,R1) BACK CHAIN IT                       03080000
|          LM    R13,R5,DSALSA-DSA(R13)  RESTORE REGS                    03100000
|          USING DSA,R13             DECLARE DSA BASE                    03110000
|  *                                                                     03130990
|  ***           CALL PROPER ROUTINE.  R0 MAY BE POS OR NEG              03150980
|  *                                                                     03170970
|          LR    R15,R0              TEST EXIT TYPE CODE                 03190960
|          SLA   R15,2               *4 TO INDEX TABLE                   03210950
|          BM    USER10              .SKIP IF COMPLEMENTED               03230940
|  *             R0 POSITIVE: FIRST CALL                                 03250930
|          LH    R15,TAB(R15)        GET ROUTINE OFFSET                  03270920
|          B     TAB(R15)            GO TO ROUTINE                       03290910
|  *             R0 NEGATIVE: SECOND CALL                                03310900
|  USER10  DS    0H                                                      03330890
|          LCR   R15,R15             RECOMPLEMENT CODE                   03350880
|          LH    R15,TAB+2(R15)      GET ROUTINE OFFSET                  03370870
|          B     TAB(R15)            GO TO ROUTINE                       03390860
|  *-------------------------------------------------------*              03410850
|  *  ROUTER TABLE.  EXIT TYPE CODES MAPPED TO ROUTINE OFFSET  *          03430840
|  *-------------------------------------------------------*              03450830
|  TAB       DC    (2*USRZZ)Y(EXITEXIT-TAB) UNSUPPORTED EXIT CODES       03470820
|          ORG   TAB+4*USRON              INVOKE APL                     03490810
|          DC    Y(ON0-TAB,ON1-TAB)                                      03510800
|          ORG   TAB+4*USRCMDAP           AP100 COMMAND                  03530790
|          DC    Y(CMDAP0-TAB,CMDAP1-TAB)                                03550780
|          ORG   TAB+4*USRCMD             SYSTEM COMMAND EXIT            03570770
|          DC    Y(CMD0-TAB,EXITEXIT-TAB)                                03590760
|          ORG   TAB+4*USRLOAD            )LOAD AND )COPY                03610750
|          DC    Y(LOAD0-TAB,LOAD1-TAB)                                  03630740
|          ORG   TAB+4*USRSAVE            )SAVE                          03650730
|          DC    Y(SAVE0-TAB,SAVE1-TAB)                                  03670720
|          ORG   TAB+4*USRDROP            )DROP                          03690710
|          DC    Y(DROP0-TAB,DROP1-TAB)                                  03710700
|          ORG   TAB+4*USRCLEAR           )CLEAR                         03730690
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|          DC    Y(CLEAR0-TAB,CLEAR1-TAB)                                 03750680
|          ORG   TAB+4*USRLIB             )LIB                           03770670
|          DC    Y(LIB0-TAB,LIB1-TAB)                                     03790660
|          ORG   TAB+4*USROFF             )OFF                           03810650
|          DC    Y(OFF0-TAB,OFF1-TAB)                                     03830640
|          ORG   TAB+4*USRDSN             SAM LIB WS DSNAME              03850630
|          DC    Y(DSN0-TAB,DSN1-TAB)                                     03870620
|          ORG   TAB+4*USRPROJ            SAM LIB PROJECT PTR            03890610
|          DC    Y(PROJ0-TAB,PROJ1-TAB)                                   03910600
|          ORG   ,                                                        03930590
| *-------------------------------------------------------*              03950580
| *  VARIOUS RETURNS FROM THE MODULE                      *              03970570
| *-------------------------------------------------------*              03990560
| EXITSKIP DS    0H                  SKIP OR RETRY, BUT R15=0            04010550
|          SR    R15,R15             RETURN RC = 0                       04030540
|          LA    R0,1                BUT NOT OFFSET 4                    04050530
|          B     EXITONR0                                                04070520
| *                                                                       04090510
| EXITRC00 SR    R15,R15             PROCEED WITH NORMAL PROCESS         04110500
| *                                                                       04130490
| EXITEXIT LR    R0,R15              DECIDE BASED ON R15 VALUE           04150480
| *                                                                       04170470
| EXITONR0 DS    0H                  SPECIFIED R15, AND R0=0 FOR +4 EXIT 04190460
|          L     R13,DSAHSA          --> HIGHER SAVE AREA                04210450
|          ST    R15,DSAEP           STORE RETURN CODE                   04230440
|          LTR   R0,R0               PROCEED IF R0=0                     04250430
|          LM    R14,R12,DSARET      (RESTORE REGS ANYWAY)               04270420
|          BNZR  R14                 RETRY RETURN                        04290410
|          B     4(,R14)             MAKE AUTHORIZED RETURN              04310400
|          TITLE 'AP2TIUSR: APL2 INVOCATION EXITS'                        04330390
| *-------------------------------------------------------*              04350380
| *  FIRST INVOCATION EXIT                               *              04370370
| *-------------------------------------------------------*              04390360
| ON0      DS    0H                  INITIAL SIGN-ON                     04410350
|          AGO   .ON0PAR                                                  04430340
| *                                                                       04450330
| ***            SET UP TO PARSE INVOCATION STRING                        04470320
| *                                                                       04490310
|          AIF   (&LIBRANG).ON0LR                                         04510300
|          IKJCPPL  ,                CMD PROCESSOR PARM LIST             04530290
| .ON0LR   ANOP                                                           04550280
| USRBUFF  DSECT                     CPPLCBUF->PASSED CMD BUFFER         04570270
| USRCMDL  DS    H                   LENGTH OF COMMAND                   04590260
| USRCMDO  DS    H                   OFFSET TO COMMAND PARM              04610250
| USRCMDT  DS    0C                  INVOCATION COMMAND TEXT             04630240
| AP2TIUSR CSECT                                                          04650230
|          LA    R1,IXPLSTG                                              04770210
|          USING CPPL,R1             DECLARE CPPL POINTER                04880000
|          L     R3,CPPLCBUF         COMMAND BUFFER                      04890000
|          USING USRBUFF,R3          DECLARE BUFFER POINTER              04900000
| .ON0PAR  AIF   (NOT &DBC).ON0DB                                         04919990
| *                                                                       04929980
| ***            SET UP INTERFACE TO A DEBUGGER                           04939970
| *                                                                       04949960
```

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|           IHACDE   ,                CONTENTS DIRECTORY ENTRY             04959950
|           IHAPSA ,                  PREFIXED SAVE (LOW MEMORY)           04969940
|           USING PSA,0                                                    04979930
|           IHARB ,                   REQUEST BLOCK                        04989920
|           IKJTCB ,                  TASK CONTROL BLOCK                   04999910
|  AP2TIUSR CSECT                                                          05009900
|           L     R14,PSATOLD         --> OUR TCB                          05020000
|           USING TCB,R14                                                  05030000
|           L     R14,TCBOTC          --> MOTHER TCB                       05040000
|           L     R14,TCBOTC          --> MOTHER'S MOTHER TCB              05045000
|           L     R15,TCBRBP          --> HER CURRENT RB                   05050000
|           USING RBBASIC,R15                                              05060000
|           SR    R14,R14                                                  05080000
|           ICM   R14,7,RBCDE+1       --> CDE FOR MODULE                   05090000
|           DROP  R15                                                      05100000
|  *                                  SKIP LOAD OF DEBUGGER IF THE CDE     05115990
|           BZ    DEBUGZ              IS NOT POINTING TO ANYTHING          05121980
|           USING CDENTRY,R14                                              05140000
|           CLC   CDNAME,=CL8'XDCCMD' IS GRANDMA OUR FAVORITE DEBUGGER?    05161360
|           BE    DEBUGX                - YES, USE IT                      05161960
|           CLC   CDNAME,=CL8'DBCCMD' COULD IT BE THE OLD ONE?             05163340
|           BNE   DEBUGZ                - GRANDMA IS NEITHER               05163940
|           LOAD  EP=DBC,ERRET=DEBUGZ FIND ENTRY POINT FOR ALTERNATE NAME  05164930
|           ST    R0,IXPTESTX         AND TELL APL2 WHERE IT IS            05166310
|           B     DEBUGZ                                                   05166910
|  DEBUGX   DS    0H                                                       05170980
|           LOAD  EP=XDC,ERRET=DEBUGZ ELSE FIND HER ENTRY POINT           05174960
|           ST    R0,IXPTESTX         AND TELL APL2 WHERE IT IS            05184990
|  DEBUGZ   DS    0H                                                       05191990
|  .ON0DB   AIF   (NOT &LIBRANG).ON0LR2                                    05233970
|  *                                                                       05273960
|  ***            SET UP AUTHORIZED LIBRARY RANGES FOR SAM LIBS            05313950
|  *                                                                       05353940
|           IKJPSCB  ,                PROTECTED STEP CONTROL BLOCK         05393930
|           IKJCPPL  ,                CMD PROCESSOR PARM LIST              05433920
|  AP2TIUSR CSECT                                                          05473910
|           L     R2,CPPLPSCB-CPPL+IXPLSTG --> PSCB                        05554990
|           USING PSCB,R2                  DECLARE PSCB BASE               05560000
|           LA    R1,LIBRANG1         POINT TO LIBRARY RANGE TABLE         05580000
|           LM    R3,R4,=F'1,-9999999' ASSUME ANY PROJECT OR PUBLIC LIB     05610000
|           TM    PSCBATR1,PSCBCTRL   IF OPER, ALLOW PUBLIC LIBS            05630000
|           BO    AUTHDFLT            .OPR - SET FULL RANGE                05679990
|           LA    R3,1000             .OTHER - DEFAULT NO PUB WRITE        05719980
|           LA    R5,USERAUTH                                              05759970
|  AUTHLOOP L     R15,8(,R5)          GET LENGTH OF NEXT LIST              05820000
|           CLI   0(R5),X'FF'         END OF LIST?                         05839990
|           BE    AUTHDFLT            .Y - SAVE CURRENT LIST               05849980
|           CLC   PSCBUSER,0(R5)      .N - IN THE LIST?                    05859970
|           BE    AUTHFND             .Y - PROCESS LIBLIST                 05870000
|           CLI   0(R5),C'*'          .N - ALL USERID'S ENTRY?             05889990
|           BE    AUTHFND             .Y - PROCESS LIBLIST                 05900000
|           LA    R5,12(R15,R5)       .N - TO NEXT USER ENTRY              05920000
|           B     AUTHLOOP                 AND CONTINUE SCAN               05930000
|  AUTHFND  DS    0H                                                       05949990
```

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|          LA    R1,12(R5)            POINT AT THE ENTRY OR LIST          05959980
|          B     AUTHDONE             AND EXIT                            05969970
|  AUTHDFLT DS   0H                                                       05979960
|          STM   R3,R4,0(R1)         STORE LIB PERMISSION TABLE          05989950
|  AUTHDONE DS   0H                                                       05999940
|          ST    R1,IXP#LIST         SAVE THE NEW LIST POINTER           06013920
|  .ON0LR2  ANOP                                                          06019920
|  *                                                                      06029910
|  ***           RETURN TO AP2TINIT                                       06039900
|  *                                                                      06049890
|          B     EXITRC00            NORMAL COMPLETION                   06059880
|          AIF   (NOT &LIBRANG).ON0LR3                                    06069870
|  *-------------------------------------------------------------*         06079860
|  *     SAMPLE AUTHORIZED LIBRARY RANGES.                       *         06089850
|  *-------------------------------------------------------------*         06099840
|  *                                                                      06109830
|  USERAUTH DS   0F                                                       06119820
|          USERL APLADMIN,(1,9999999)   AUTHORITY FOR EVERYTHING         06129810
|          USERL USER01,(500,509),(1000,1009) TWO RANGES                 06139800
|          USERL USER02,502,503,1002,1003  FOUR SPECIFIC LIBRARIES       06149790
|          USERL D026546,(1,9999999)    NOT A USER, A PUSHER!            06159780
|          USERL *,(100,999999)         TSO DEFAULT ALL BUT 1-99         06169770
|          USERL ,(1000,9999999)        BATCH DEFAULT PROJECT ONLY        06179760
|          DC    8X'FF'              END OF LIST                         06189750
|  .ON0LR3  ANOP                                                          06199740
|  *-------------------------------------------------------------*         06209730
|  *  SECOND INVOCATION EXIT                                     *         06219720
|  *-------------------------------------------------------------*         06229710
|  ON1      DS   0H                  ENTRY AFTER COMMAND PARSE           06239700
|          AIF   (NOT &SAMDSN).ON1SD                                      06249690
|          MVI   SAMNAME,X'01'       SELECT IBM SAM DSN CONVENTION       06259680
|  .ON1SD   ANOP                                                          06269670
|  *                                                                      06279660
|  ***           SOME THINGS YOU MIGHT WANT TO CHECK                      06289650
|  *                                                                      06299640
|  *        L     R2,PTXCODE          TERMCODE VALUE -1                   06309630
|  *        LTR   R2,R2                                                   06319620
|  *        BM    CTLINVOC                                                06329610
|  *                                                                      06339600
|  *        TM    IXPDTYPE,IXPBATCH   RUNNING IN BATCH?                  06353580
|  *        BO    BATCH                                                   06359580
|          B     EXITRC00                                                06369570
|          TITLE 'AP2TIUSR: )OFF EXITS'                                  06379560
|  *-------------------------------------------------------------*         06389550
|  *  FIRST )OFF EXIT                                            *         06399540
|  *-------------------------------------------------------------*         06409530
|  OFF0     DS   0H                  GET DSA WORK AREA                   06890000
|          B     EXITRC00            RETURN (NO ACTION)                  06949990
|  *-------------------------------------------------------------*         06999980
|  *  SECOND )OFF EXIT                                           *         07049970
|  *-------------------------------------------------------------*         07099960
|  OFF1     DS   0H                  RESTORE WORK AREA POINTER           07150000
|          L     R2,DSAHSA           --> HIGHER SAVE AREA                07199990
|          LA    R0,DSALEN           GET DSA LENGTH                      07250000
```

```
|          FREEMAIN R,LV=(0),A=(R13)                                    07269990
|          LR    R13,R2                 RESTORE SAVE AREA POINTER      07280000
|          LM    R14,R12,DSARET-DSA(R2) (RESTORE REGS ANYWAY)           07290000
|          B     4(,R14)                MAKE AUTHORIZED RETURN         07300000
|          TITLE 'AP2TIUSR: )LOAD EXITS'                               07418980
|  *-------------------------------------------------------*            07518970
|  *  FIRST )LOAD EXIT                                     *            07618960
|  *-------------------------------------------------------*            07718950
|  LOAD0    DS    0H                                                   07910000
|  *                                                                   07939990
|  ***           SOME THINGS YOU MIGHT WANT TO CHECK                   07959980
|  *                                                                   07979970
|  *        TM    LIBFLAG,LIBMODE     IS THIS A VSAM LIBRARY?         07999960
|  *        BO    LOD0VSAM            .YES                            08019950
|          TM    PTHWSTAT,PTHSORS    COPY CALLING LOAD?              08080000
|          BZ    EXITRC00            NO, RETURN                      08114980
|          AIF   (NOT &LDONLY).LOAD0LO                                08134970
|          TM    IXPLOCAL,IXPAUTH    USER AUTHORIZED TO )SAVE        08163950
|          BZ    EXITRC00            .Y - THEN )COPY IS OK.          08174950
|          L     R1,IXPLIBNO         LIBRARY NUMBER                  08203930
|          C     R1,LOADONLY        LIBRARY # IS )LOAD ONLY          08214930
|          BNE   EXITRC00            EXIT                            08234920
|          QUEUE MSGLOAD                                               08263900
|          LA    R15,RCLIBUNA        .YES - )LOAD-ONLY TO YOU        08274900
|          B     EXITEXIT           RETURN WITH ERROR                08294890
|  *                                                                   08314880
|  MSGLOAD  DC    C'WORKSPACES MAY NOT BE COPIED FROM THIS LIBRARY'    08334870
|          AGO   .LOAD0L2                                              08354860
|  .LOAD0LO ANOP                                                       08374850
|          B     EXITRC00                                              08394840
|  .LOAD0L2 ANOP                                                       08414830
|  *-------------------------------------------------------*            08434820
|  *  SECOND )LOAD EXIT                                    *            08454810
|  *-------------------------------------------------------*            08474800
|  LOAD1    DS    0H                                                   08650000
|  *                                                                   08669990
|  ***           SOME THINGS YOU MIGHT WANT TO CHECK                   08679980
|  *                                                                   08689970
|  *        TM    LIBFLAG,LIBMODE     TEST FOR SAM LIBRARY SUPPORT    08699960
|  *        BO    LOD1VSAM            NO,BRANCH                       08709950
|          AIF   (NOT &LDONLY).LOAD1LO                                08719940
|          LH    R15,PTHSRCOD        START WITH LOAD RETURN CODE     08790000
|          LTR   R15,R15             GOOD RETURN CODE ...            08800000
|          BNZ   EXITRC00            .N - EXIT                       08816990
|          TM    PTHWSTAT,PTHSORS    COPY CALLING LOAD?              08824000
|          BO    COPY1               YES, GO CHECK IT OUT            08833990
|          MVI   USRFLAGS,0          FORGET OLD RESTRICTIONS         08841980
|          MVC   USRWSA#,IXPALIB     SAVE ACTIVE WORKSPACE #         08859990
|          MVC   USRWSAN,IXPANAM     SAVE ACTIVE WORKSPACE NAME      08869980
|          XC    USRWSP#1(USRCPYWS),USRWSP#1  NO MORE COPIES         08880000
|          TM    IXPLOCAL,IXPAUTH    USER AUTHORIZED TO )SAVE        08904990
|          BZ    LOAD1A              .Y - THEN ANYTHING GOES         08910000
|          CLC   IXPALIB,LOADONLY    GET WORKSPACE LIB NUMBER        08934990
|  *                                 IS IT LOAD-ONLY                 08940000
```

```
|          BNE   LOAD1A              .NO - NEXT                              08950000
|          OI    USRFLAGS,USRLOADO   .YES - MARK IT SO                       08970000
|          B     EXITRC00             AND RETURN                            08989990
|  LOAD1A  DS    0H                                                          08999980
|          CLC   IXPALIB,NOSAVE      IS IT A NO-SAVE WS                      09013960
|          BNE   EXITRC00            .NO - JUST EXIT                         09019960
|          OI    USRFLAGS,USRNOSAV   .YES - REMEMBER IT                      09030000
|          B     EXITRC00             AND RETURN                            09239990
|  *                                                                         09439980
|  NOSAVE  DC    F'440'              NO-SAVE LIBRARY NUMBER                  09639970
|  LOADONLY DC   F'441'              LOAD-ONLY LIBRARY NUMBER                09839960
|  *                                                                         10039950
|  COPY1   DS    0H                                                          10290000
|  *             R2=TABLE ADDRESS, R4=INCREMENT, R5=ENDING TABLE ADDRESS     10319990
|          L     R1,IXPLIBNO         LIBRARY NUMBER                        10355380
|          LA    R2,USRWSA#          START BACK ONE FOR BXH                10355440
|          LA    R4,USRSTEP          INCREMENT                             10355530
|          LA    R5,USRWSP#4         STOPPING POINT                        10355620
|  *                                                                         10355790
|  COPY1P  BXH   R2,R4,EXITRC00      END OF LOOP                             10355870
|          L     R0,0(,R2)           TABLE LIB NUMBER                      10355980
|          LTR   R0,R0               NO ENTRY ...                          10356070
|          BZ    COPY1FR             .N - IT'S FREE                        10356160
|          CR    R0,R1               DOES IT MATCH OURS                    10356340
|          BNZ   COPY1P              .N - KEEP LOOKING                     10356430
|          CLC   4(8,R2),IXPNAME    .LIBNO MATCHES: WSNAME ?                10356640
|          BNE   COPY1P              .N - KEEP LOOKING                     10356700
|  COPY1FR DS    0H                  FREE OR DUPLICATE SLOT                10356880
|          ST    R1,0(,R2)           .Y - RECORD LIB #                     10357060
|          MVC   4(8,R2),IXPNAME          RECORD WSNAME                    10364140
|          L     R1,IXPALIB         LIBRARY NUMBER                        10371130
|          C     R1,NOSAVE          LIBRARY # IS )COPY,NO )SAVE           10380000
|          BNE   EXITRC00           .NO - NORMAL RETURN                   10399990
|          OI    USRFLAGS,USRNOSAV  .YES - THEN YOU CAN'T )SAVE           10410000
|  .LOAD1LO ANOP                                                           10499990
|          B     EXITRC00            RETURN                                10579980
|          TITLE 'AP2TIUSR: )SAVE EXITS'                                   10659970
|  *-------------------------------------------------------*               10739960
|  *  FIRST )SAVE EXIT                                     *               10819950
|  *-------------------------------------------------------*               10899940
|  SAVE0   DS    0H                                                        11000000
|  *       TM    LIBFLAG,LIBMODE     TEST FOR SAM LIBRARY SUPPORT          11039990
|  *       BO    SAV0VSAM            NO,BRANCH                             11069980
|          AIF   (NOT &LDONLY).SAVE0LO                                     11099970
|          TM    USRFLAGS,USRNOSAV+USRLOADO NO )SAVE ...                   11160000
|          BZ    EXITRC00            RETURN (NO ACTION)                    11179990
|          QUEUE FAILSAFE                                                  11193970
|          LA    R15,RCLIBLOK        WS LOCKED                             11199970
|          B     EXITEXIT            RETURN (FAILED)                       11209960
|  *                                 (ABORT THE SAVE)                      11250000
|  FAILSAFE DC C'WORKSPACE CONTAINS PROPRIETRARY DATA.  MAY NOT BE SAVED'   11319990
|  .SAVE0LO ANOP                                                           11379980
|  SAVEOK  B     EXITRC00            RETURN                                11439970
|  *-------------------------------------------------------*               11499960
```

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*  SECOND )SAVE EXIT                                          *          11559950
*-----------------------------------------------------------*          11619940
SAVE1    DS    0H                                                      11700000
*        TM    LIBFLAG,LIBMODE     TEST FOR SAM LIBRARY SUPPORT        11749990
*        BO    SAV1VSAM            NO,BRANCH                           11789980
         LH    R15,PTHSRCOD        GET )SAVE RETURN CODE               11840000
         LTR   R15,R15             GOOD RETURN CODE ...                11850000
         BNZ   SAVEEXIT            .N - EXIT                          11860000
         AIF   (NOT &LDONLY).SAVE1LO                                   11879990
         MVC   USRWSA#,IXPALIB     SAVE ACTIVE WORKSPACE #             11909990
         MVC   USRWSAN,IXPANAM     SAVE ACTIVE WORKSPACE NAME          11919980
.SAVE1LO ANOP                                                          11939990
SAVEEXIT B     EXITRC00           EXIT USER EXIT                      11960000
         TITLE 'AP2TIUSR: )LIB EXITS'                                  11960710
*-----------------------------------------------------------*          11961300
*  FIRST )LIB EXIT                                          *          11961890
*-----------------------------------------------------------*          11962480
LIB0     DS    0H                                                      11963500
*        TM    LIBFLAG,LIBMODE     TEST FOR SAM LIBRARY SUPPORT        11964060
*        BO    LIB0VSAM            NO,BRANCH                           11964550
         B     EXITRC00            RETURN (NO ACTION)                  11965040
*-----------------------------------------------------------*          11965530
*  SECOND )LIB EXIT                                         *          11966020
*-----------------------------------------------------------*          11966510
LIB1     DS    0H                                                      11967700
*        TM    LIBFLAG,LIBMODE     TEST FOR SAM LIBRARY SUPPORT        11997760
*        BO    LIB1VSAM            NO,BRANCH                           12027750
*        LH    R15,PTHSRCOD        GET )LIB RETURN CODE                12057740
*        LTR   R15,R15             GOOD RETURN CODE ...                12087730
*        BNZ   EXITRC00            .N - EXIT                           12117720
         B     EXITRC00            RETURN                              12147710
         TITLE 'AP2TIUSR: )CLEAR EXITS'                                12177700
*-----------------------------------------------------------*          12207690
*  FIRST )CLEAR EXIT                                         *          12237680
*-----------------------------------------------------------*          12267670
CLEAR0   DS    0H                                                      12310000
         B     EXITRC00            RETURN (NO ACTION)                  12389990
*-----------------------------------------------------------*          12459980
*  SECOND )CLEAR EXIT                                        *          12529970
*-----------------------------------------------------------*          12599960
CLEAR1   DS    0H                                                      12690000
         AIF   (NOT &LDONLY).CLR1LO                                    12709990
         MVC   USRWSA#,IXPALIB     SAVE ACTIVE WORKSPACE #             12739990
         MVC   USRWSAN,IXPANAM     SAVE ACTIVE WORKSPACE NAME          12749980
         XC    USRWSP#1(USRCPYWS),USRWSP#1  NO MORE COPIES             12760000
         MVI   USRFLAGS,0          FORGET OLD RESTRICTIONS             12849990
.CLR1LO  ANOP                                                          12929980
         B     EXITRC00                                                13009970
         TITLE 'AP2TIUSR: )DROP EXITS'                                 13089960
*-----------------------------------------------------------*          13169950
*  FIRST )DROP EXIT                                          *          13249940
*-----------------------------------------------------------*          13329930
DROP0    DS    0H                                                      13410000
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|  *        TM    LIBFLAG,LIBMODE     TEST FOR SAM LIBRARY SUPPORT         13499990
|  *        BO    DRO0VSAM            NO,BRANCH                            13579980
|           B     EXITRC00            RETURN (NO ACTION)                   13659970
|  *-------------------------------------------------------------*          13739960
|  *  SECOND )DROP EXIT                                         *          13819950
|  *-------------------------------------------------------------*          13899940
|  DROP1    DS    0H                                                       13980000
|  *        TM    LIBFLAG,LIBMODE     TEST FOR SAM LIBRARY SUPPORT         14019990
|  *        BO    DRO1VSAM            NO,BRANCH                            14049980
|           AIF   (NOT &LDONLY).DROP1LO                                    14079970
|           LH    R15,PTHSRCOD        GET )SAVE RETURN CODE                14120000
|           LTR   R15,R15             GOOD RETURN CODE ...                 14130000
|           BNZ   EXITRC00            .N - EXIT                            14159990
|           MVC   USRWSA#,IXPALIB     SAVE ACTIVE WORKSPACE #              14185990
|           MVC   USRWSAN,IXPANAM     SAVE ACTIVE WORKSPACE NAME           14191980
|  .DROP1LO ANOP                                                           14200390
|           B     EXITRC00            RETURN                               14200780
|           TITLE 'AP2TIUSR: SAM LIBRARY DSNAME EXITS'                     14201170
|  *-------------------------------------------------------------*          14201560
|  *  FIRST DSNAME EXIT                                          *          14201950
|  *-------------------------------------------------------------*          14202340
|  DSN0     DS    0H                  ENTRY POINT                          14202730
|           B     EXITRC00            RETURN (PROCEED)                     14203120
|  *-------------------------------------------------------------*          14205070
|  *  SECOND DSNAME EXIT                                         *          14205460
|  *-------------------------------------------------------------*          14205850
|  DSN1     DS    0H                  ENTRY POINT                          14206240
|  *                                                                       14206630
|           AIF   (NOT &SAMDSN).DSN1SD                                     14207020
|           CLI   SAMNAME,X'02'       DSN1 CONVENTION?                     14207410
|           BNE   EXITRC00            NO, RETURN                           14207800
|           MVI   USERID,C' '         CLEAR TO BLANKS                      14208190
|           MVC   USERID+1(L'USERID-1),USERID                               14208580
|           LA    R15,C'.'            STOP WHEN SEE A PERIOD               14208970
|           SR    R1,R1               START AT BEGINNING OF FIELDS         14209360
|           IC    R0,IXPWSDSN         PICK UP 1ST CHARACTER                14209840
|  DSN12D   DS    0H                                                       14210140
|           STC   R0,USERID(R1)       STORE A CHARACTER                    14210530
|           LA    R1,1(R1)                                                 14210920
|           IC    R0,IXPWSDSN(R1)     GET THE NEXT ONE                     14211400
|           CR    R0,R15              IF STILL IN NAME                     14211700
|           BNE   DSN12D              THEN KEEP SCANNING                   14212090
|  *              SEARCH IN TABLE FOR USERID, EXTRACT DEPT#                14212480
|           LA    R0,L'DSTAB          LENGTH OF EACH ENTRY                 14212870
|           LA    R1,DSTABZ-1         END OF TABLE                         14213260
|           LA    R15,DSTAB           START AT BEGINNING OF TABLE          14213650
|           USING DSTABD,R15                                               14214040
|  DSN12G   DS    0H                                                       14214430
|           BXH   R15,R0,DSN12M       ERROR IF NOT FOUND                   14214820
|           CLC   DSTABU,USERID       IF THIS IS NOT THE ENTRY             14215210
|           BNE   DSN12G              THEN KEEP LOOKING                    14215600
|  *                                                                       14215990
|           MVC   NEWNAME(L'DSTABP),DSTABP                                 14216380
|           MVI   NEWNAME+L'DSTABP,C' '  ENSURE A BLANK                    14216770
```

```
|          DROP  R15                                                    14217160
|          LA    R14,NEWNAME-1      ALLOW FOR LEADING INCR              14217550
|  DSN12K  DS    0H                                                     14217940
|          LA    R14,1(,R14)        INCREMENT POINTER                   14218330
|          CLI   0(R14),C' '        IF NO BLANK YET                     14218720
|          BNE   DSN12K             THEN KEEP LOOKING                   14219110
|  *                                                                    14219500
|          LA    R0,IXPWSDSN        MERGE IN IBM DSNAME                 14220080
|          LH    R1,IXPWSDSL        LENGTH TO MOVE                      14220270
|          LR    R15,R1                                                 14220670
|          MVCL  R14,R0             MOVE IT IN                          14221060
|          MVC   IXPWSDSN,NEWNAME                                       14221540
|          LA    R0,NEWNAME         COMPUTE NEW LENGTH                  14221840
|          SR    R14,R0                                                 14222230
|          STH   R14,IXPWSDSL       AND STORE FOR RETURN TO AP2TLIB     14222710
|          B     EXITRC00                                               14223010
|  DSN12M  DS    0H                                                     14223400
|          QUEUE DSNMSG                                                 14223880
|  DSNMSG  DC    C'LIBRARY SYSTEM DOES NOT SUPPORT THIS USERID: SEE YOUR +14223970
|                SYSTEM ADMINISTRATOR'                                  14224060
|          LA    R15,RCLIBDRD       AND GO TAKE THE                     14224570
|          B     EXITEXIT           ERROR RETURN                        14224960
|  *                                                                    14225350
|  DSTABD  DSECT ,                                                      14225740
|  DSTABU  DS    CL8     USERID                                         14226130
|  DSTABP  DS    CL6     DSN PREFIX (YOUR LENGTHS MAY DIFFER)           14226520
|  AP2TIUSR CSECT                                                       14226910
|  DSTAB   DS   0CL26 -USERID-    -PREFIX-                              14227300
|          DC    CL8'VSAPLTS ',CL6'@.M30.'                              14227690
|          DC    CL8'M173233 ',CL6'@.M30.'                              14228080
|          DC    CL8'S584014 ',CL6'@.M46.'                              14228470
|          DC    CL8'BRENTH  ',CL6'@.M30.'                              14228860
|          DC    CL8'A601605 ',CL6'@.M46.'                              14229250
|          DC    CL8'W711032 ',CL6'@.J88.'                              14229640
|          DC    CL8'CROWDER ',CL6'@.M30.'                              14230030
|          DC    CL8'H241162 ',CL6'@.M46.'                              14230420
|          DC    CL8'C248646 ',CL6'@.M46.'                              14230810
|          DC    CL8'@PL     ',CL6'@.M30.'                              14231200
|  DSTABZ  EQU   *                 END OF THE TABLE                     14231590
|  .DSN1SD ANOP                                                         14231980
|          B     EXITRC00                                               14232370
|          TITLE 'AP2TIUSR: SAM LIBRARY PROJECT POINTER EXITS'          14232760
|  *-----------------------------------------------------------*         14233150
|  *  FIRST PROJECT POINTER EXIT                             *         14233540
|  *-----------------------------------------------------------*         14233930
|  PROJ0   DS    0H                ENTRY POINT                         14234320
|          AIF   (NOT &SAMDSN).PROJ0SD                                  14234710
|          CLI   SAMNAME,X'02'     DSN1 CONVENTION?                    14235100
|          BNE   EXITRC00          NO, RETURN                          14235490
|          LA    R0,L'UNTAB        LENGTH OF EACH ENTRY                14235880
|          LA    R1,UNTABZ-1       END OF TABLE                        14236270
|          LA    R15,UNTAB         START AT BEGINNING OF TABLE         14236660
|          USING UNTABD,R15                                             14237050
```

```
|          L     R14,IXPLIBNO                                            14237530
|  PROJ02G  DS    0H                                                     14237830
|          BXH   R15,R0,PROJ02M     ERROR IF NOT FOUND                  14238220
|          C     R14,UNTABL         IF THIS IS NOT THE ENTRY            14238610
|          BNE   PROJ02G            THEN KEEP LOOKING                   14239000
|  *       LIBRARY # FOUND: RETURN OWNING USERID FROM TABLE TO AP2TLIB    14239390
|  PROJ02C  DS    0H                                                     14239860
|          L     R1,IXPPROJP                                            14239940
|          MVC   0(L'UNTABID,R1),UNTABID  MOVE IN USERID                14240020
|          B     EXITRC00           AND GO RETURN                       14240170
|  *       HANDLE LIBRARY # NOT FOUND IN TABLE ERROR                      14240560
|  PROJ02M  QUEUE PROJMSG                                                14241240
|          LA    R15,RCLIBDRD       SPECIFY ERROR EXIT                  14241730
|          B     EXITEXIT           AND GO RETURN TO AP2TLIB            14242120
|  PROJMSG  DS    C'LIBRARY SYSTEM DOES NOT SUPPORT THIS LIBRARY #: SEE YO+14242220
|                UR SYSTEM ADMINISTRATOR'                                14242320
|  *                                                                     14242510
|  UNTABD   DSECT ,                                                      14242900
|  UNTABL   DS    F       LIBRARY NUMBER                                 14243290
|  UNTABID  DS    CL8     USERID                                         14243680
|  AP2TIUSR CSECT                                                        14244070
|  UNTAB    DS   0CL12 -LIB-  -USERID-                                   14244460
|          DC    F'1234',CL8'S584014 '                                  14244850
|          DC    F'2222',CL8'VSAPLTS '                                  14245240
|          DC    F'3333',CL8'M173233 '                                  14245630
|  UNTABZ   EQU   *                  END OF TABLE                        14246020
|  .PROJ0SD ANOP                                                         14246410
|          B     EXITRC00                                               14246800
|  *-------------------------------------------------------------*       14247190
|  *  SECOND PROJECT POINTER EXIT                               *       14247580
|  *-------------------------------------------------------------*       14247970
|  PROJ1    DS    0H                 ENTRY POINT                         14256990
|          B     EXITRC00           RETURN (PROCEED)                    14257270
|          TITLE 'AP2TIUSR: UNIVERSAL SYSTEM COMMAND EXIT'               14307980
|  *-------------------------------------------------------------*       14357970
|  *  FIRST (AND ONLY) SYSTEM COMMAND EXIT                      *       14407960
|  *-------------------------------------------------------------*       14457950
|  CMD0     DS    0H                                                     14550000
|          L     R1,IXPPARM3         COMMAND UNKNOWN?                   14571270
|          LTR   R1,R1                                                   14571660
|          BNM   CMD0LOAD            NO, BRANCH                         14571960
|  *                                                                     14572540
|          AIF   (NOT &CMDCHK).CMD0CC                                   14572630
|          L     R1,IXPPARM1          POINT TO COMMAND NAME             14573130
|          LA    R15,RCCMDERR         REJECT RC TO R15                  14573430
|          CLC   0(6,R1),=CL6'REJECT' REJECT COMMAND?                    14573920
|          BE    EXITEXIT             YES, TAKE REJECT RETURN           14574410
|          LA    R15,RCCMDSKP         AN IGNORE RC TO 15                14575290
|          CLC   0(6,R1),=CL6'IGNORE' IGNORE COMMAND                     14575880
|          BE    EXITEXIT             YES, TAKE IGNORE RETURN           14576440
|  .CMD0CC  AIF   (NOT &SAMDSN).CMD0SD                                   14576510
|          IC    R1,SAMNAME           DSNAME NAMING CONVENTION IN USE   14576580
|          MVI   SAMNAME,X'01'        ASSUME STANDARD IBM CONVENTION    14576650
|          LA    R15,RCCMDSKP           AN IGNORE RC TO 15              14576720
```

```
|           CLC   0(8,R1),=CL8'SAMNAME1' USER WANTS IT?                    14576790
|           BE    EXITEXIT               YES, GO RETURN                    14576860
|           MVI   SAMNAME,X'02'        ASSUME DSN1 NAMING CONVENTION       14576930
|           CLC   0(8,R1),=CL8'SAMNAME2' USER WANTS IT?                    14577100
|           BE    EXITEXIT               YES, GO RETURN                    14577120
|           STC   R1,SAMNAME           RESTORE PREVIOUS NAMING CONVENTION  14577330
|  .CMD0SD  ANOP                                                           14577520
|  CMD0LOAD LA    R15,RCCMDTRY        LET INTERPRETER HANDLE ALL           14577840
|           AIF   (NOT &LDONLY).CMD0LO                                     14589990
|           TM    USRFLAGS,USRLOADO+USRNOSAV  LOAD-ONLY OR NO-SAVE?        14599980
|           BZ    EXITEXIT            .N - NO FURTHER CHECKING             14634990
|           L     R1,IXPPARM3         PICK UP COMMAND CODE                 14641380
|           LA    R0,COUT                                                  14641980
|           CR    R0,R1               IS IT )OUT                           14642970
|           BE    CMD0ERR2            .Y - NOT PERMITTED                   14643960
|           TM    USRFLAGS,USRLOADO   LOAD-ONLY WS ...                     14644950
|           BZ    EXITEXIT            .N - NO FURTHER CHECKING             14645940
|           LA    R0,CMORE                                                 14646930
|           CR    R0,R1               IS IT )MORE                          14647920
|           BE    EXITEXIT            .Y - THAT'S OK                       14648910
|           LA    R0,CCLEAR                                                14649900
|           CR    R0,R1               IS IT )CLEAR                         14650890
|           BE    EXITEXIT            .Y - THAT'S OK                       14660000
|           LA    R0,CLOAD                                                 14675990
|           CR    R0,R1               IS IT )LOAD                          14681980
|           BE    EXITEXIT            .Y - THAT'S OK                       14690000
|           LA    R0,COFF                                                  14705990
|           CR    R0,R1               IS IT )OFF                           14711980
|           BE    EXITEXIT            .Y - THAT'S OK                       14720000
|           LA    R0,CWSID                                                 14735990
|           CR    R0,R1               IS IT )WSID                          14741980
|           BNE   CMD0ERR             .N - COMMAND ERROR                   14750000
|  *              FOR )WSID, BE SURE IS INQUIRY ONLY                       14769990
|           L     R1,IXPPARM1         POINT TO FIRST CHARACTER OF STRING   14781490
|           LA    R2,1                SET BXH INCREMENT = 1                14781980
|           L     R3,IXPPARM2         POINT R3 TO LAST CHARACTER OF STRING 14782190
|           AR    R3,R1                                                    14782250
|           SR    R3,R2                                                    14782340
|  *                                                                       14783570
|  CMD0BLN1 BXH   R1,R2,EXITEXIT      INCREMENT BY 1; BRANCH IF PAST END   14785250
|           CLI   0(R1),C' '          BLANK ENCOUNTERED?                   14786240
|           BNE   CMD0BLN1            NO, KEEP SCANNING FOR FIRST BLANK    14787230
|  *                                                                       14789210
|  CMD0BLN2 BXH   R1,R2,EXITEXIT      INCREMENT BY 1; BRANCH IF PAST END   14791750
|           CLI   0(R1),C' '          NON-BLANK ENCOUNTERED?               14792640
|           BE    CMD0BLN2            NO, KEEP SCANNING FOR NON-BLANK      14823520
|  *                                                                       14853510
|  CMD0ERR  DS    0H                                                       14883500
|           QUEUE CMDMSG                                                   14923480
|           LA    R15,RCCMDERR        .NO - NOT WITH MY WORKSPACE          14943480
|           B     EXITEXIT                                                 14973470
|  CMDMSG   DC C'ACTIVE WORKSPACE IS RESTRICTED'                           15003460
|  *                                                                       15033450
|  CMD0ERR2 DS    0H                  SAY CAN'T SAVE -- OR USE )OUT        15063440
```

```
|          QUEUE FAILSAFE                                                 15103420
|          LA    R15,RCCMDERR        .NO - NOT WITH MY WORKSPACE          15123420
| .CMD0LO  ANOP                                                           15153410
|          B     EXITEXIT                                                 15183400
|          TITLE 'AP2TIUSR: AP 100 COMMAND EXIT'                          15213390
| *-------------------------------------------------------------*          15243380
| *  FIRST AP 100 COMMAND EXIT                                  *          15273370
| *-------------------------------------------------------------*          15303360
| CMDAP0   DS    0H                                                       15480000
|          AIF   (NOT &XXCMDS).CMDAP0X                                    15519990
|          LA    R5,RSTDCMDS         GET ADDRESS OF RSTD CMDS            15550000
|          L     R6,IXPPARM1         POINT R6 TO COMMAND NAME            15561990
|          LA    R15,4               FORCE AN ERROR RETURN               15565000
| CMDAP010 DS    0H                  LOOP POINT FOR LIST                 15580000
|          CLI   0(R5),X'FF'         AT END OF LIST?                     15590000
|          BE    CMDAP030            YES, THEN EXIT WITH RC 0            15600000
|          CLC   0(L'RSTDCMDS,R6),0(R5) NO, THEN RESTRICTED CMD?         15620000
|          BE    CMDAP020            YES, THEN SET RC 1                  15630000
|          LA    R5,L'RSTDCMDS(,R5)  NO, BUMP TO NEXT CMD                15650000
|          B     CMDAP010            AND TRY IT                          15660000
| CMDAP020 DS    0H                  RESTRICTED CMD ENTERED              15680000
|          B     EXITEXIT            AND EXIT                            15700000
| *                                                                       15729990
| RSTDCMDS DS    0CL8               BEGINNING OF RESTRICTED CMDS         15749980
|          DC    CL8'TEST'          TEST IS A RESTRICTED COMMAND         15769970
| *******  DC    CL8'LOGON'         LOGON CMD RESTRICTED                 15789960
| *******  DC    CL8'LOGOFF'        LOGOFF CMD RESTRICTED                15809950
| RSTDEND  DC    F'-1'              END OF RESTRICTED LIST               15829940
| .CMDAP0X ANOP                                                           15849930
| CMDAP030 DS    0H                  SET GOOD RC                         15869920
|          B     EXITRC00            RETURN (CONTINUE EXECUTION)         15889910
| *-------------------------------------------------------------*          15909900
| *  SECOND AP 100 COMMAND EXIT                                 *          15929890
| *-------------------------------------------------------------*          15949880
| CMDAP1   DS    0H                                                       15970000
|          B     EXITRC00                                                 16049990
|          SPACE 3                                                        16650000
|          LTORG ,                                                        16660000
|          END   ,                                                        16700000
```

Appendix G. Sample Invocation CLISTs

AP2CLSTV and AP2CLSTS apply to APL2. AP2CLSTE applies to APL2 Application Environment.

AP2CLSTV

```
| PROC 0  AISIZE() APNAMES() CASE() CODE() DATEFORM() DBCS() DEBUG()     -
|         DSOPEN() EXCLUDE() FREESIZE() HILIGHT() ID() INPUT() LOADLIB() -
|         NLT() PROFILE(DEFAULT) QUIET RUN() SHRSIZE() SMAPL() SVMAX()   -
|         SYSDEBUG() TERMCODE() TRACE() WSSIZE() XA()
| /*****************************************************************/
| /* APL2 VERSION 2 RELEASE 2                                      */
| /* LICENSED MATERIALS - PROPERTY OF IBM                          */
| /* 5688-228 (C) COPYRIGHT IBM CORP. 1984, 1994.                  */
| /* SEE COPYRIGHT INSTRUCTIONS.                                   */
| /*****************************************************************/
| /*                                                               */
| /*   APL2 SAMPLE INVOCATION CLIST WITH VSAM LIBRARIES            */
| /*                                                               */
| /*****************************************************************/
| /*                                                               */
| CONTROL MAIN NOFLUSH NOPROMPT MSG
| /*                                                               */
| /*                                                               */
| ALLOC FI(W0)       DA(PRIVATE.WSLIB) OLD   /*  PRIVATE WORKSPACES    */
| ALLOC FI(F0)       DA(PRIVATE.FILIB) OLD   /*  PRIVATE FILES         */
| /*                                          (SESSION MANAGER LOG)*/
| /*                                          (COPY TEMPORARY DATA)*/
| /*                                          (AP121 FILES)         */
| /*                                         PUBLIC WORKSPACES      */
| ALLOC FI(W1)       DA('APL2.LIB0001.PUBWKSPS') SHR
| ALLOC FI(W2)       DA('APL2.LIB0002.PUBWKSPS') SHR
| ALLOC FI(ADMSYMBL) DA('APL2.SAP2SYMB'       /* GDDM SYMBOL SETS      */-
|                       'GDDM.ADMSYMBL') SHR
| ALLOC FI(AP2TN011) DA('APL2.SAP2NICK') SHR  /* PROCESSOR 11 NAMES    */
| ALLOC FI(APL2HELP) DA('APL2.SAP2HELP') SHR  /* HELP TEXT FILES       */
| ALLOC FI(APL2LANG) DA('APL2.SAP2LANG') SHR  /* LANGUAGE MSG. FILES   */
| ALLOC FI(APLDUMP)  SYSOUT(A)                /* APL FORMATTED DUMPS   */
| ALLOC FI(APLTRACE) SYSOUT(A)                /* APL TRACE DIAGNOSTICS */
| ALLOC FI(CPYSWAP)  NEW SP(3 10) CYLINDERS   /* WS OVERFLOW IN )COPY  */
| ALLOC FI(CPYSPILL) NEW SP(3 10) CYLINDERS   /* DATA OVERFLOW IN )COPY*/
| /*                                                               */
| /************** INVOKE APL2 ***************************************/
| /*                                                               */
| APL2 AI(&AISIZE) AP(&APNAMES) CA(&CASE) CO(&CODE) DA(&DATEFORM)        -
|      DBCS(&DBCS) DE(&DEBUG) DS(&DSOPEN) EX(&EXCLUDE) FR(&FREESIZE)     -
|      HI(&HILIGHT) ID(&ID) IN(&INPUT) LO(&LOADLIB) NLT(&NLT)            -
|      PR(&PROFILE) &QUIET RUN(&RUN) SH(&SHRSIZE) SM(&SMAPL) SV(&SVMAX)  -
|      SYS(&SYSDEBUG) TE(&TERMCODE) TR(&TRACE) WS(&WSSIZE) XA(&XA)
| /*                                                               */
| /*                                                               */
```

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```
|  /*                                                                 */
|  /*                                    WS AND FILE LIBRARIES        */
|  FREE FI(W0 F0                         /* PRIVATE                   */-
|          W1 W2)                        /* PUBLIC                    */
|  /*                                    OTHER FILES                  */
|  FREE FI(ADMSYMBL                      /* GDDM SYMBOLS              */-
|          AP2TN011                      /* PROCESSOR 11 NAMES        */-
|          APL2HELP                      /* HELP FILES                */-
|          APL2LANG                      /* LANGUAGE FILES            */-
|          APLDUMP                       /* DUMPS                     */-
|          APLTRACE                      /* TRACES                    */-
|          CPYSWAP                       /* WS OVERFLOW IN )COPY      */-
|          CPYSPILL)                     /* WS DATA IN )COPY          */
|  /*                                                                 */
|  /*           UPDATE DIRECTORY FOR THIS CLIST                       */
|  /* PROC STATEMENT             ALL PARAMETERS.                      */
|  /* CONTROL STATEMENT          ALL PARAMETERS.                      */
|  /* ALLOC FILE(W0) STMT        DATA SET NAME. SEE MEMBER AP2JBVSM.  */
|  /* ALLOC FILE(F0) STMT        DATA SET NAME. SEE MEMBER AP2JBVSM.  */
|  /* ALLOC FILE(W1-2) STMTS     DATA SET NAMES. SEE MEMBER AP2JBVSM  */
|  /* ALLOC FILE(ADMSYMBL) STMT  DATA SET NAMES. IF GDDM IS NOT USED  */
|  /*                            THIS STATEMENT CAN BE ELIMINATED.    */
|  /* ALLOC FILE(AP2TN011) STMT  DATA SET NAME. SEE MEMBER AP2JBALC.  */
|  /* ALLOC FILE(APL2HELP) STMT  DATA SET NAME. SEE MEMBER AP2JBALC.  */
|  /* ALLOC FILE(APL2LANG) STMT  DATA SET NAME. SEE MEMBER AP2JBALC.  */
|  /* ALLOC FILE(APL2PROF) STMT  DATA SET NAME. SEE MEMBER AP2JBALC.  */
|  /* ALLOC FILE(APLDUMP)  STMT  SYSOUT CLASS.                        */
|  /* ALLOC FILE(APLTRACE) STMT  ALL PARAMETERS.                      */
|  /* APL2 STATEMENT             ALL PARAMETERS.                      */
```

AP2CLSTS

```
| PROC 0  AISIZE() APNAMES() CASE() CODE() DATEFORM() DBCS() DEBUG()     -
|         DSOPEN() EXCLUDE() FREESIZE() HILIGHT() ID() INPUT() LOADLIB() -
|         NLT() PROFILE(DEFAULT) QUIET RUN() SHRSIZE() SMAPL() SVMAX()   -
|         SYSDEBUG() TERMCODE() TRACE() WSSIZE() XA()
| /*****************************************************************/
| /* APL2 VERSION 2 RELEASE 2                                      */
| /* LICENSED MATERIALS - PROPERTY OF IBM                          */
| /* 5688-228 (C) COPYRIGHT IBM CORP. 1984, 1994.                  */
| /* SEE COPYRIGHT INSTRUCTIONS.                                   */
| /*****************************************************************/
| /*                                                               */
| /*   APL2 SAMPLE INVOCATION CLIST WITH SAM LIBRARIES             */
| /*                                                               */
| /*****************************************************************/
| /*                                                               */
| CONTROL MAIN NOFLUSH NOPROMPT MSG
| /*                                                               */
| ALLOC FI(ADMSYMBL) DA('APL2.SAP2SYMB'       /* GDDM SYMBOL SETS     */-
|                       'GDDM.ADMSYMBL') SHR
| ALLOC FI(AP2TN011) DA('APL2.SAP2NICK') SHR  /* PROCESSOR 11 NAMES   */
| ALLOC FI(APL2HELP) DA('APL2.SAP2HELP') SHR  /* HELP TEXT FILES      */
| ALLOC FI(APL2LANG) DA('APL2.SAP2LANG') SHR  /* LANGUAGE MSG. FILES  */
| ALLOC FI(APLDUMP)  SYSOUT(A)                /* APL FORMATTED DUMPS  */
| ALLOC FI(APLTRACE) SYSOUT(A)                /* APL TRACE DIAGNOSTICS */
| ALLOC FI(CPYSWAP)  NEW SP(3 10) CYLINDERS   /* WS OVERFLOW IN )COPY  */
| ALLOC FI(CPYSPILL) NEW SP(3 10) CYLINDERS   /* DATA OVERFLOW IN )COPY*/
| /*                                                               */
| /************** INVOKE APL2 ***************************************/
| /*                                                               */
| APL2 AI(&AISIZE) AP(&APNAMES) CA(&CASE) CO(&CODE) DA(&DATEFORM)       -
|      DBCS(&DBCS) DE(&DEBUG) DS(&DSOPEN) EX(&EXCLUDE) FR(&FREESIZE)    -
|      HI(&HILIGHT) ID(&ID) IN(&INPUT) LO(&LOADLIB) NLT(&NLT)           -
|      PR(&PROFILE) &QUIET RUN(&RUN) SH(&SHRSIZE) SM(&SMAPL) SV(&SVMAX)  -
|      SYS(&SYSDEBUG) TE(&TERMCODE) TR(&TRACE) WS(&WSSIZE) XA(&XA)
| /*                                                               */
| /*                                                               */
| FREE FI(ADMSYMBL                            /* GDDM SYMBOLS         */-
|         AP2TN011                            /* PROCESSOR 11 NAMES   */-
|         APL2HELP                            /* HELP FILES           */-
|         APL2LANG                            /* LANGUAGE FILES       */-
|         APLDUMP                             /* DUMPS                */-
|         APLTRACE                            /* TRACES               */-
|         CPYSWAP                             /* WS OVERFLOW IN )COPY  */-
|         CPYSPILL)                           /* WS DATA IN )COPY     */
| /*                                                               */
| /*           UPDATE DIRECTORY FOR THIS CLIST                     */
| /* PROC STATEMENT             ALL PARAMETERS.                    */
| /* CONTROL STATEMENT          ALL PARAMETERS.                    */
| /* ALLOC FILE(ADMSYMBL) STMT  DATA SET NAMES. IF GDDM IS NOT USED  */
| /*                           THIS STATEMENT CAN BE ELIMINATED.    */
| /* ALLOC FILE(AP2TN011) STMT  DATA SET NAME. SEE MEMBER AP2JBALC.  */
```

```
|  /* ALLOC FILE(APL2HELP) STMT  DATA SET NAME. SEE MEMBER AP2JBALC.    */
|  /* ALLOC FILE(APL2LANG) STMT  DATA SET NAME. SEE MEMBER AP2JBALC.    */
|  /* ALLOC FILE(APL2PROF) STMT  DATA SET NAME. SEE MEMBER AP2JBALC.    */
|  /* ALLOC FILE(APLDUMP)  STMT  SYSOUT CLASS.                          */
|  /* ALLOC FILE(APLTRACE) STMT  ALL PARAMETERS.                        */
|  /* APL2 STATEMENT             ALL PARAMETERS.                        */
```

AP2CLSTE

```
| PROC 0  AISIZE() APNAMES() CASE() CODE() DATEFORM() DBCS() DEBUG()     -
|         DSOPEN() EXCLUDE() FREESIZE() HILIGHT() ID() INPUT() LOADLIB() -
|         NLT() QUIET RUN() SHRSIZE() SVMAX()                            -
|         SYSDEBUG() TERMCODE() TRACE() WSSIZE() XA()
| /*****************************************************************/
| /* APL2 VERSION 2 RELEASE 2                                       */
| /* LICENSED MATERIALS - PROPERTY OF IBM                           */
| /* 5688-228, 5688-229 (C) COPYRIGHT IBM CORP. 1987, 1994.         */
| /* SEE COPYRIGHT INSTRUCTIONS.                                    */
| /*****************************************************************/
| /*                                                               */
| /*   APL2 SAMPLE INVOCATION FOR APPLICATION ENVIRONMENT          */
| /*                                                               */
| /*****************************************************************/
| /*                                                               */
| CONTROL MAIN NOFLUSH NOPROMPT MSG
| /*                                                               */
| ALLOC FI(ADMSYMBL) DA('GDDM.ADMSYMBL') SHR  /* GDDM SYMBOL SETS      */
| ALLOC FI(AP2TN011) DA('APL2.SAP2NICK') SHR  /* PROCESSOR 11 NAMES    */
| ALLOC FI(APL2HELP) DA('APL2.SAP2HELP') SHR  /* HELP TEXT FILES       */
| ALLOC FI(APL2LANG) DA('APL2.SAP2LANG') SHR  /* LANGUAGE MSG. FILES   */
| /*ALLOC FI(APLIN) DA(xxxxxx)*/              /* INPUT STATEMENTS      */
| /*ALLOC FI(APLPRINT) DA(xxxxxx)*/           /* APL SESSION LOG       */
| ALLOC FI(APLDUMP)  SYSOUT(A)                /* APL FORMATTED DUMPS   */
| ALLOC FI(APLTRACE) SYSOUT(A)                /* APL TRACE DIAGNOSTICS */
| /*                                                               */
| /************** INVOKE APL2 ***************************************/
| /*                                                               */
| APL2AE AI(&AISIZE) AP(&APNAMES) CA(&CASE) CO(&CODE) DA(&DATEFORM)      -
|      DBCS(&DBCS) DE(&DEBUG) DS(&DSOPEN) EX(&EXCLUDE) FR(&FREESIZE)     -
|      HI(&HILIGHT) ID(&ID) IN(&INPUT) LO(&LOADLIB) NLT(&NLT)            -
|      &QUIET RUN(&RUN) SH(&SHRSIZE) SV(&SVMAX)                          -
|      SYS(&SYSDEBUG) TE(&TERMCODE) TR(&TRACE) WS(&WSSIZE) XA(&XA)
| /*                                                               */
| /*                                                               */
| FREE FI(ADMSYMBL                            /* GDDM SYMBOLS          */-
|         AP2TN011                            /* PROCESSOR 11 NAMES    */-
|         APL2HELP                            /* HELP FILES            */-
|         APL2LANG                            /* LANGUAGE FILES        */-
|         APLDUMP                             /* DUMPS                 */-
|         APLTRACE)                           /* TRACES                */
| /*FREE FI(APLIN APLPRINT)*/                  /* INPUT/OUTPUT DATASETS */
| /*                                                               */
| /*           UPDATE DIRECTORY FOR THIS CLIST                     */
| /* PROC STATEMENT             ALL PARAMETERS.                     */
| /* CONTROL STATEMENT          ALL PARAMETERS.                     */
| /* ALLOC FILE(ADMSYMBL) STMT  DATA SET NAMES. IF GDDM IS NOT USED  */
| /*                           THIS STATEMENT CAN BE ELIMINATED.     */
| /* ALLOC FILE(AP2TN011) STMT  DATA SET NAME. SEE MEMBER AP2JEALC    */
| /*                                              OR     AP2JBALC.   */
| /* ALLOC FILE(APL2LANG) STMT  DATA SET NAME. SEE MEMBER AP2JEALC    */
```

```
| /*                                              OR     AP2JBALC.    */
| /* ALLOC FILE(APL2HELP) STMT  DATA SET NAME. SEE MEMBER AP2JEALC     */
| /*                                              OR     AP2JBALC.    */
| /* ALLOC FILE(APL2PROF) STMT  DATA SET NAME. SEE MEMBER AP2JEALC     */
| /*                                              OR     AP2JBALC.    */
| /* ALLOC FILE(APLIN) STMT     CHANGE TO DATA SET NAME, IF DESIRED    */
| /* ALLOC FILE(APLPRINT) STMT  CHANGE TO DATA SET NAME, IF DESIRED    */
| /* ALLOC FILE(APLDUMP) STMT   SYSOUT CLASS.                          */
| /* ALLOC FILE(APLTRACE) STMT  ALL PARAMETERS.                        */
| /* APL2AE STATMENT            ALL PARAMETERS.                       */
```

Appendix H. Default Session Manager Profile

```
| ************************************************************
| *  APL2 Version 2 Release 2
| *  Licensed Materials - Property of IBM
| *  5688-228, 5688-229 (C) COPYRIGHT IBM CORP. 1984, 1994.
| *  See Copyright Instructions
| ************************************************************
| COLUMN WRAP
| COPY OFF ID * CODE 0
| DISPLAY ON HOLD ON ORIGIN DEFAULT SIZE DEFAULT CODE 0
| LOG SIZE 8140
| PFK 1 IMMEDIATE HELP
| PFK 2 DELAY
| PFK 3 APL DELAY )LOAD
| PFK 4 IMMEDIATE COPY SCREEN
| PFK 5 IMMEDIATE SUPPRESS
| PFK 6 APL DELAY )SAVE
| PFK 7 IMMEDIATE PAGE -1
| PFK 8 IMMEDIATE PAGE +1
| PFK 9 APL DELAY →⎕LC
| PFK 10 IMMEDIATE COLUMN -40
| PFK 11 IMMEDIATE COLUMN +40
| PFK 12 APL DELAY →
| PFK 13 IMMEDIATE HELP
| PFK 14 DELAY
| PFK 15 APL DELAY )LOAD
| PFK 16 IMMEDIATE COPY SCREEN
| PFK 17 IMMEDIATE SUPPRESS
| PFK 18 APL DELAY )SAVE
| PFK 19 IMMEDIATE PAGE -1
| PFK 20 IMMEDIATE PAGE +1
| PFK 21 APL DELAY →⎕LC
| PFK 22 IMMEDIATE COLUMN -40
| PFK 23 IMMEDIATE COLUMN +40
| PFK 24 APL DELAY →
```

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Appendix I. Sample IVP Execution Log

Sample IVP Execution Log for APL2

```
| * SAMPLE OUTPUT FOR APL2 * * INVOKED BY:  APL2 RUN(TSOIVP)

| LICENSED MATERIALS - PROPERTY OF IBM  5688-228, 5688-229
| (C) COPYRIGHT IBM CORP. 1984, 1992.  ALL RIGHTS RESERVED.
| US GOVERNMENT USERS RESTRICTED RIGHTS - USE, DUPLICATION OR
| DISCLOSURE RESTRICTED BY GSA ADP SCHEDULE CONTRACT WITH IBM CORP.
| * IBM - TRADEMARK OF INTERNATIONAL BUSINESS MACHINES

|     APL2 2.2.00 (English)
|     Version 2 Release 2

| CLEAR WS
| 1
|       TSOIVP
|     APL2 INSTALLATION VERIFICATION PROGRAM
|     5688-228, 5688-229

|     THIS PROGRAM WILL DISPLAY INFORMATION DETERMINED
|     ABOUT THE INSTALLATION OF THIS APL2 SYSTEM.
|     INDENTED MESSAGES ARE INFORMATION ONLY, WHILE MESSAGES
|     PRECEDED BY '>>>' SHOULD BE INVESTIGATED AS POSSIBLE
|     INDICATION OF AN INCORRECT INSTALLATION.

|     THE INSTALLATION PROCESS IS DESCRIBED IN "APL2
|     INSTALLATION AND CUSTOMIZATION UNDER TSO" (SH21-1055).

|     HOST ENVIRONMENT
|     ----------------

|     CPU MODEL 3090  - SMF IDENTIFIER MVS1
|     (31-BIT ADDRESSING MODE)

|     MVS/SP5  OPERATING SYSTEM                LEVEL SP5.1.0
|     TSO/E    SUBSYSTEM                       LEVEL 2.04.0
|     ACF/VTAM TP ACCESS METHOD                LEVEL 2.0
|     GDDM     GRAPHICAL DATA DISPLAY MANAGER  LEVEL V3R1.0
|     RACF     RESOURCE ACCESS CONTROL FACILITY LEVEL 2.01.0
|     HSM      HIERARCHICAL STORAGE MANAGER    LEVEL 2.2.1

|     VECTOR FACILITY IN USE

|     APL2 PROGRAM PRODUCT NUMBER 5688-228
|     APL2 SYSTEM LEVEL: 2.2.00

|     SHARED MEMORY: LOCAL
|     GLOBAL SVP REQUESTED (SERVER CSVP) BUT RUNNING AS LOCAL
```


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```
|      ASSOCIATED PROCESSORS:
|      ---------------------

|      VERIFYING REXX PROCESSOR (10 NA)
|      REXX PROCESSOR (10 NA) VERIFIED

|      VERIFYING EXTERNAL FUNCTION PROCESSOR (11 NA)
|      EXTERNAL FUNCTION PROCESSOR (11 NA) VERIFIED

|      VERIFYING FILE PROCESSOR (12 NA)
|      FILE PROCESSOR (12 NA) VERIFIED

|      AUXILIARY PROCESSORS:
|      ---------------------

|      VERIFICATION OF APL2 APS:

|      VERIFYING AP100 HOST COMMAND AUXILIARY PROCESSOR
|      AP100 VERIFIED

|      VERIFYING AP101 ALTERNATE INPUT AUXILIARY PROCESSOR
|      AP101 VERIFIED

|      VERIFYING AP102 STORAGE ACCESS AUXILIARY PROCESSOR
|      AP102 VERIFIED

|      VERIFYING AP104 (ONLY FOR INTERNAL USE BY APL2)
|      AP104 VERIFIED

|      VERIFYING AP111 QSAM AUXILIARY PROCESSOR
|      AP111 VERIFIED

|      VERIFYING AP119 TCP/IP AUXILIARY PROCESSOR
|      AP119 VERIFIED

|      VERIFYING AP120 APL2 SESSION MANAGER COMMAND AUXILIARY PROCESSOR
|      AP120 VERIFIED

|      VERIFYING AP121 APL DATA FILE AUXILIARY PROCESSOR
|      AP121 VERIFIED

|      VERIFYING AP123 VSAM AUXILIARY PROCESSOR
|      AP123 VERIFIED

|      VERIFYING AP124 FULL SCREEN MANAGEMENT AUXILIARY PROCESSOR
|      AP124 VERIFIED

|      VERIFYING AP126 GDDM AUXILIARY PROCESSOR
|      AP126 VERIFIED

|      VERIFYING AP127 SQL AUXILIARY PROCESSOR
|      SYSTEM CATALOG ENTRY FOR APL2:
|        AP2V2R2C VSAPLTS  940129 R S Y Y 10494842 1976 E 0 U C N N N N N
|        AP2V2R2R VSAPLTS  940129 R R Y Y 15061477 1968 E 0 U C N N N N C

|        DB2ADM   VSAPLTS  1024 1 N                  0
|        DB2ADM   VSAPLTS  1024 1 N                  0
|      AP127 VERIFIED

|      VERIFYING AP210 BDAM FILE AUXILIARY PROCESSOR
|      AP210 VERIFIED

|      VERIFYING AP211 APL2 OBJECT FILE AUXILIARY PROCESSOR
|      AP211 VERIFIED
```

```
|      APL2 SESSION MANAGER:
|      ---------------------
|      AVAILABLE, IN USE (PSS NOT IN USE)

|      WORKSPACE LIBRARY:
|      ------------------

|      APL2 WORKSPACE  1 DISPLAY  : WS IN PLACE
|      APL2 WORKSPACE  1 EXAMPLES : WS IN PLACE
|      APL2 WORKSPACE  1 MATHFNS  : WS IN PLACE
|      APL2 WORKSPACE  1 MEDIT    : WS IN PLACE
|      APL2 WORKSPACE  1 SUPPLIED : WS IN PLACE
|      APL2 WORKSPACE  1 UTILITY  : WS IN PLACE
|      APL2 WORKSPACE  1 WSINFO   : WS IN PLACE
|      APL2 WORKSPACE  2 APLDATA  : WS IN PLACE
|      APL2 WORKSPACE  2 CHARTX   : WS IN PLACE
|      APL2 WORKSPACE  2 FILESERV : WS IN PLACE
|      APL2 WORKSPACE  2 FSC126   : WS IN PLACE
|      APL2 WORKSPACE  2 FSM      : WS IN PLACE
|      APL2 WORKSPACE  2 GRAPHPAK : WS IN PLACE
|      APL2 WORKSPACE  2 GDMX     : WS IN PLACE
|      APL2 WORKSPACE  2 PRINTWS  : WS IN PLACE
|      APL2 WORKSPACE  2 SQL      : WS IN PLACE
|      APL2 WORKSPACE  2 TRANSFER : WS IN PLACE
|      APL2 WORKSPACE  2 TSO      : WS IN PLACE
|      APL2 WORKSPACE  2 VAPLFILE : WS IN PLACE
|      APL2 WORKSPACE  2 VSAMDATA : WS IN PLACE


|      END OF INSTALLATION VERIFICATION PROGRAM.

|        )OFF
|  Connected 0.0.49
|  CPU time 0.0.4
```

Sample IVP Execution Log for APL2 Application Environment

```
* SAMPLE OUTPUT FOR APPLICATION ENVIRONMENT * * INVOKED BY:  APL2AE RUN(TSOIVP

LICENSED MATERIALS - PROPERTY OF IBM  5688-228, 5688-229
(C) COPYRIGHT IBM CORP. 1984, 1992.  ALL RIGHTS RESERVED.
US GOVERNMENT USERS RESTRICTED RIGHTS - USE, DUPLICATION OR
DISCLOSURE RESTRICTED BY GSA ADP SCHEDULE CONTRACT WITH IBM CORP.
* IBM - TRADEMARK OF INTERNATIONAL BUSINESS MACHINES

    APL2 2.2.00 (English)
    (Application Environment)
    Version 2 Release 2

CLEAR WS
1
      TSOIVP
    APL2 INSTALLATION VERIFICATION PROGRAM
    5688-228, 5688-229

    THIS PROGRAM WILL DISPLAY INFORMATION DETERMINED
    ABOUT THE INSTALLATION OF THIS APL2 SYSTEM.
    INDENTED MESSAGES ARE INFORMATION ONLY, WHILE MESSAGES
    PRECEDED BY '>>>' SHOULD BE INVESTIGATED AS POSSIBLE
    INDICATION OF AN INCORRECT INSTALLATION.

    THE INSTALLATION PROCESS IS DESCRIBED IN "APL2
    INSTALLATION AND CUSTOMIZATION UNDER TSO" (SH21-1055).

    HOST ENVIRONMENT
    ----------------

    CPU MODEL 3090  - SMF IDENTIFIER MVS1
    (31-BIT ADDRESSING MODE)

    MVS/SP5  OPERATING SYSTEM                LEVEL SP5.1.0
    TSO/E    SUBSYSTEM                       LEVEL 2.04.0
    ACF/VTAM TP ACCESS METHOD                LEVEL 2.0
    GDDM     GRAPHICAL DATA DISPLAY MANAGER  LEVEL V3R1.0
    RACF     RESOURCE ACCESS CONTROL FACILITY LEVEL 2.01.0
    HSM      HIERARCHICAL STORAGE MANAGER    LEVEL 2.2.1

    VECTOR FACILITY IN USE

    APL2 PROGRAM PRODUCT NUMBER 5688-229
    APL2 SYSTEM LEVEL: 2.2.00

    SHARED MEMORY: LOCAL
    GLOBAL SVP REQUESTED (SERVER CSVP) BUT RUNNING AS LOCAL

    ASSOCIATED PROCESSORS:
    ----------------------

    VERIFYING REXX PROCESSOR (10 □NA)
    REXX PROCESSOR (10 □NA) VERIFIED

    VERIFYING EXTERNAL FUNCTION PROCESSOR (11 □NA)
    EXTERNAL FUNCTION PROCESSOR (11 □NA) VERIFIED

    VERIFYING FILE PROCESSOR (12 □NA)
    FILE PROCESSOR (12 □NA) VERIFIED
```

```
     AUXILIARY PROCESSORS:
     ---------------------

     VERIFICATION OF APL2 APS:

     VERIFYING AP100 HOST COMMAND AUXILIARY PROCESSOR
     AP100 VERIFIED

     VERIFYING AP101 ALTERNATE INPUT AUXILIARY PROCESSOR
     AP101 VERIFIED

     VERIFYING AP102 STORAGE ACCESS AUXILIARY PROCESSOR
     AP102 VERIFIED

     VERIFYING AP111 QSAM AUXILIARY PROCESSOR
     AP111 VERIFIED

     VERIFYING AP119 TCP/IP AUXILIARY PROCESSOR
     AP119 VERIFIED

     VERIFYING AP121 APL DATA FILE AUXILIARY PROCESSOR
     AP121 VERIFIED

     VERIFYING AP123 VSAM AUXILIARY PROCESSOR
     AP123 VERIFIED

     VERIFYING AP124 FULL SCREEN MANAGEMENT AUXILIARY PROCESSOR
     AP124 VERIFIED

     VERIFYING AP126 GDDM AUXILIARY PROCESSOR
     SESSION MANAGER NOT IN USE.  GDDM MAY ERASE 327X SCREEN
     AP126 VERIFIED

     VERIFYING AP127 SQL AUXILIARY PROCESSOR
     SYSTEM CATALOG ENTRY FOR APL2:
       AP2V2R2C VSAPLTS  940129 R S Y Y 10494842 1976 E 0 U C N N N N N
       AP2V2R2R VSAPLTS  940129 R R Y Y 15061477 1968 E 0 U C N N N N C

       DB2ADM   VSAPLTS  1024 1 N                  0
       DB2ADM   VSAPLTS  1024 1 N                  0
     AP127 VERIFIED

     VERIFYING AP210 BDAM FILE AUXILIARY PROCESSOR
     AP210 VERIFIED

     VERIFYING AP211 APL2 OBJECT FILE AUXILIARY PROCESSOR
     AP211 VERIFIED


     END OF INSTALLATION VERIFICATION PROGRAM.

       )OFF
Connected 0.0.49
CPU time 0.0.4
```

Appendix J. Sample Global SVP Startup Procedure

```
| //APL2SVP  PROC
| //*
| //*******************************************************************
| //* APL2 VERSION 2 RELEASE 2                                        *
| //* LICENSED MATERIALS - PROPERTY OF IBM                            *
| //* 5688-228, 5688-229 (C) COPYRIGHT IBM CORP. 1984, 1994.          *
| //* SEE COPYRIGHT INSTRUCTIONS.                                     *
| //*******************************************************************
| //*
| //*******************************************************************
| //*   THIS PROCEDURE STARTS UP THE GLOBAL SHARED VARIABLE PROCESSOR  *
| //*   OF APL2                                                       *
| //*******************************************************************
| //CSVPRUN  EXEC PGM=AP2TCSVS
| //*
| //STEPLIB  DD   DSN=SYS1.LINKLIB,DISP=SHR
| //SYSPRINT DD   SYSOUT=*
| //SYSUDUMP DD   SYSOUT=*
| //SNAP     DD   SYSOUT=*
| //SVPPARMS DD   DSN=APL2.AAP2SAMP(AP2XPARM),DISP=SHR
| //*           UPDATE DIRECTORY FOR THIS PROCEDURE
| //* STEPLIB DD STATEMENT     DATA SET NAME, IF NECESSARY. IF THE SHARED
| //*                          VARIABLE PROCESSOR IS INSTALLED INTO
| //*                          SYS1.LINKLIB (THE DEFAULT) OR IF IT IS
| //*                          INSTALLED INTO AN AUTHORIZED DATA SET THAT
| //*                          IS IN THE LINK LIST CONCATENATION IN THE
| //*                          LNKLSTXX MEMBER OF SYS1.PARMLIB, THIS
| //*                          STATEMENT CAN BE ELIMINATED; IF NOT,
| //*                          YOU MUST CHANGE THE DATA SET NAME
| //*                          TO THE NAME OF THE TARGET LIBRARY USED,
| //*                          WHICH MUST BE AN AUTHORIZED LIBRARY.
| //* SVPPARMS DD STMT         DATA SET NAME. CHANGE THE NAME TO
| //*                          SYS1.PARMLIB OR TO THE SAME NAME USED IN
| //*                          THE AP2JBALC JOB (AP2JEALC FOR THE
| //*                          APPLICATION ENVIRONMENT PRODUCT).
| //* SVPPARMS DD STMT         MEMBER NAME, IF DESIRED, IF INSTALLED IN
| //*                          SYS1.PARMLIB.
```

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Appendix K. TCP/IP Samples

This appendix provides TCP/IP samples.

Startup Procedure (AP2PSRV)

```
//AP2PSRV  PROC
//*
//*********************************************************************
//* APL2 VERSION 2 RELEASE 2                                          *
//* LICENSED MATERIALS - PROPERTY OF IBM                              *
//* 5688-228, 5688-229 (C) COPYRIGHT IBM CORP. 1992, 1994.            *
//* SEE COPYRIGHT INSTRUCTIONS.                                       *
//*********************************************************************
//*                                                                   *
//* This is a procedure for running the APL2 TCP/IP Port Server.      *
//*                                                                   *
//* The dd statement SYSTSIN should identify the dataset containing   *
//* the AP2XPSRV file containing the TSO commands used to invoke APL2 *
//* and run the port server.                                          *
//*                                                                   *
//*********************************************************************
//TSOTMP   EXEC PGM=IKJEFT01,DYNAMNBR=50,REGION=4096K,TIME=1440
//*STEPLIB  DD DISP=SHR,DSN=APL2.SAP2LMDS
//APL2LANG DD DISP=SHR,DSN=APL2.SAP2LANG
//AP2TN011 DD DISP=SHR,DSN=APL2.SAP2NICK
//SYSTSIN  DD DISP=SHR,DSN=SYS1.PARMLIB(AP2XPSRV)
//SYSTSPRT DD SYSOUT=*
//APLPRINT DD SYSOUT=*
//APLIN    DD DUMMY
//CONTINUE DD DUMMY
```


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Startup Parameters (AP2XPSRV)

```
/*********************************************************************/
/* APL2 VERSION 2 RELEASE 2                                          */
/* LICENSED MATERIALS - PROPERTY OF IBM                              */
/* 5688-228, 5688-229 (C) COPYRIGHT IBM CORP. 1984, 1994.            */
/* SEE COPYRIGHT INSTRUCTIONS.                                       */
/*********************************************************************/
/*                                                                   */
/* This is a sample stream of TSO commands to invoke APL2 and run the */
/* APL2 TCP/IP Port Server.  This data set should be identified by    */
/* the SYSTSIN DD statement in the port server initialization         */
/* procedure AP2PSRV.                                                */
/*                                                                   */
/* The APL2 invocation option INPUT contains 2 parameters to the port */
/* server.                                                           */
/*                                                                   */
/* The first is the TCP/IP port number the server should use.  The    */
/* default is 31415.                                                 */
/*                                                                   */
/* The second is the password the server should require for           */
/* processing authorized commands.  The default is no password which  */
/* prevents anyone from issuing authorized commands.  A password      */
/* should be provided for administration of the port server.  If no   */
/* password is provided, the port server will not accept the shut-    */
/* down command.  The sample command in this file provides a password.*/
/*                                                                   */
/* Each port server parameter must be enclosed in quotes.  Here are   */
/* samples of correctly using quotes to provide the values:          */
/*                                                                   */
/*    INPUT(' ' 'SECRET')      Password and default port number      */
/*    INPUT('9999' 'SECRET')   Both port number and password         */
/*                                                                   */
/*********************************************************************/
APL2 RUN(SERVER) DEBUG(35) INPUT(' ' 'SECRET')
LOGOFF
```

User Profile (AP2TCPIP)

```
| ************************************************************************
| *
| *  APL2 Version 2 Release 2
| *  Licensed Materials - Property of IBM
| *  5688-228, 5688-229 (C) COPYRIGHT IBM CORP. 1992, 1994.
| *  See Copyright Instructions
| *
| ************************************************************************
| *
| * Sample APL2 TCP/IP Profile File
| *
| * In the VM/CMS environment, the TCP/IP profile file is a sequential
| * file called AP2TCPIP APL2PROF and must be on an accessed CMS minidisk.
| * In the MVS/TSO environment, the TCP/IP profile file is a member of a
| * partitioned data set.  The member name is AP2TCPIP.  The partitioned
| * data set must be allocated to ddname APL2PROF.  Concatenated
| * allocation is supported and can be used to override profile files.
| *
| * The TCP/IP profile file may contain fixed or variable length records
| * with a maximum record length of 255 bytes.  Any line that starts with
| * an * is a comment.

| * There are 2 types of entries in a TCPIP profile:
| *
| * Identification entry (:svopid):
| *   These entries are used to convert the left argument of □SVO
| *   to an extended ID (xid). They are also used to convert an xid
| *   from a remote processor back to a single processor number.
| *
| *   ID entries are required to make an offer to a local processor
| *   dependent on a parent different from the offerer or to make an
| *   offer to a processor on a different machine and/or userid.
| *
| * Authorization entry (:procauth):
| *   These entries are used to authorize remote processors to share
| *   variables with local processors.
| *
| * Any line that starts with an * is a comment.
| *
| * Each data line in a TCP/IP profile file can contain one or more tags
| * and data.  Tag data may not be continued onto new records.  Each entry
| * must begin with an :svopid tag or a :procauth tag. For example:
| *
| *      +-----------------------------------------+
| *      |                                         |
| *      |   * Sample remote processor identification |
| *      |   :svopid.34567                         |
| *      |      :address.123.45.234.64             |
| *      |      :userid.johndoe                    |
| *      |      :processor.127,23435               |
| *      |                                         |
```

```
| *      |   * Sample local processor identification  |
| *      |   :svopid.34567                            |
| *      |      :processor.127,1002                   |
| *      |                                            |
| *      |   * Sample authorization                   |
| *      |   :procauth.127,23435                      |
| *      |      :rsvopid.34567                        |
| *      |                                            |
| *      +--------------------------------------------+
| *
| *
| * TCP/IP PROFILE TAGS
| *
| * The format of TCP/IP profile tags is as follows:
| *
| * :tag.value
| *
| * where :tag. is chosen from the following set of keywords and
| * identifies the meaning of value.  Tags and their values can be coded
| * in either upper, lower, or mixed case letters.  There are no column
| * dependencies except that asterisks identifying comment records must
| * appear in column 1.  When an :svopid or :procauth tag occurs multiple
| * times in a TCP/IP profile entry, only the first occurrence of the tag
| * is used.
| *
| * :svopid.id    (numeric - 0 to 32767)
| *
| *          The processor ID number specified by the local user in the
| *          left argument of □SVO or the number from which □SVQ
| *          will report offers have arrived.  This tag identifies the
| *          beginning of an identification entry and is required.
| *
| *
| * :address.addr  (4 part dotted numeric 1-255 or 0)
| *
| *          The IP address of the potential partner's machine in standard
| *          internet format consisting of four decimal numbers between 0
| *          and 255 separated by decimal points.  This tag is optional.
| *          The default is the local IP address or 0 if TCP/IP is not
| *          installed.
| *

| * :userid.user   (alphanumeric)
| *
| *          The userid of a potential partner with whom you may share
| *          variables. The value must be coded in the correct case.
| *          This tag is optional. The default is the local userid
| *          or 0 if TCP/IP is not installed.
| *
| * :processor.id  (1 to 3 numeric separated by commas)
| *
| *          A processor number and optionally a parent and pparent.
| *
| * :procauth.id   (1 to 3 numeric - 1 to 32767 separated by commas or '*')
```

```
| *
| *          This entry authorizes one or more remote processors
| *          to share with a local processor. The id value specifies
| *          the local processor to which shares are being authorized.
| *          An '*' defines authorization for ANY local processor.
| *          This tag identifies the beginning of an authorization
| *          entry and is required.
| *
| *
| * :rsvopid.id   (1 or more numeric separated by commas or '*')
| *
| *          This entry identifies the processors which are authorized
| *          to share with the processor identified by :procauth. Each
| *          number refers to an :svopid entry identifying the authorized
| *          remote processor. An '*' authorizes all processors.
| *
| *
| * :tcpipsrv.id
| *
| *          The port number being used by the TCP/IP port server on the
| *          potential partner's machine.  This tag is optional; it
| *          defaults to 31415.
| *
| *
| *
| * APL2 Version 2 Release 1 used a different format for the profile.
| * This format is still accepted but may be used only when sharing
| * with Version 2 Release 1. See the Release 1 documentation for a
| * description of the format.
| *
| *      +---------------------------------------+
| *      |                                       |
| *      |   * Sample TCP/IP entry for id 34567  |
| *      |   * Version 2 Release 1 Compatibility |
| *      |   :SVOPID.34567                       |
| *      |      :PROTOCOL.TCPIP                  |
| *      |      :RADDRESS.123.45.234.64          |
| *      |      :USERID.JOHNDOE                  |
| *      |      :PROCID.127                      |
| *      |                                       |
| *      +---------------------------------------+
| *
```

Appendix L. SCRIPT/VS Support

This appendix describes the modifications to be made to SCRIPT/VS Release 3 in order for the SCRIPT/VS user to exploit the APL2 fonts. A complete description of the modification procedure is contained in *Document Composition Facility SCRIPT/VS Language Reference*.

Box Character Set

Code the DSMBCS macro to define the APL2 box characters as follows:

```
DSMBCS NAME=APL,
       CROSS=2C,
       VBAR=1A,
       HBAR=2D,
       ULCORNR=1C,
       URCORNR=1B,
       LLCORNR=1E,
       LRCORNR=1F,
       TOPTEE=3B,
       BOTTEE=3E,
       LEFTEE=3D,
       RIGHTEE=3F
```

Line Printer Font Information

Code the DSMFIB macros to define the APL2 fonts as follows:

```
DSMFIB   NAME=AD10,WTABLE=PROP10,BCS=APL,PITCH=10,FS=4
DSMFIB   NAME=AD12,WTABLE=PROP12,BCS=APL,PITCH=12,FS=4
DSMFIB   NAME=AG10,WTABLE=PROP10,BCS=APL,PITCH=10,FS=4
DSMFIB   NAME=AG12,WTABLE=PROP12,BCS=APL,PITCH=12,FS=4
DSMFIB   NAME=AG15,WTABLE=PROP15,BCS=APL,PITCH=15,FS=4
DSMFIB   NAME=AI10,WTABLE=MONO10,BCS=VAN,PITCH=10,FS=2
DSMFIB   NAME=AI12,WTABLE=MONO12,BCS=VAN,PITCH=12,FS=2
DSMFIB   NAME=APL,WTABLE=MONO10,BCS=APL,PITCH=10,FS=4
DSMFIB   NAME=AT10,WTABLE=PROP10,BCS=APL,PITCH=10,FS=4
DSMFIB   NAME=AT12,WTABLE=PROP12,BCS=APL,PITCH=12,FS=4
```

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Bibliography

APL2 Publications

- *APL2 Fact Sheet,* GH21-1090
- *APL2/370 Application Environment Licensed Program Specifications,* GH21-1063
- *APL2/370 Licensed Program Specifications,* GH21-1070
- *APL2 for AIX/6000 Licensed Program Specifications,* GC23-3058
- *APL2 for Sun Solaris Licensed Program Specifications,* GC26-3359
- *APL2/370 Installation and Customization under CMS,* SH21-1062
- *APL2/370 Installation and Customization under TSO,* SH21-1055
- *APL2 Migration Guide,* SH21-1069
- *APL2 Programming: Language Reference,* SH21-1061
- *APL2/370 Programming: Processor Interface Reference,* SH21-1058
- *APL2 Reference Summary,* SX26-3999
- *APL2 Programming: An Introduction to APL2,* SH21-1073
- *APL2 for AIX/6000: User's Guide,* SC23-3051
- *APL2 for OS/2: User's Guide,* SH21-1091
- *APL2 for Sun Solaris: User's Guide,* SH21-1092
- *APL2 for the IBM PC: User's Guide,* SC33-0600
- *APL2 GRAPHPAK: User's Guide and Reference,* SH21-1074
- *APL2 Programming: Using Structured Query Language,* SH21-1057
- *APL2/370 Programming: Using the Supplied Routines,* SH21-1056
- *APL2/370 Programming: System Services Reference,* SH21-1054
- *APL2/370 Diagnosis Guide,* LY27-9601
- *APL2/370 Messages and Codes,* SH21-1059

Other Books You Might Need

The following book is recommended:

- *APL2 at a Glance*, by James Brown, Sandra Pakin, and Raymond Polivka, published by Prentice-Hall, ISBN 0-13-038670-7 (1988). (Copies can be ordered from IBM as SC26-4676.)

Plastic replacement keyboard keycaps are included with this product. Additional sets of keyboard keycaps are available from IBM as:

- *APL2 Keycaps (US and UK base set)*, SX80-0270
- *APL2 Keycaps, German upgrade to SX80-0270*, SX23-0452
- *APL2 Keycaps, French upgrade to SX80-0270*, SX23-0453
- *APL2 Keycaps, Italian upgrade to SX80-0270*, SX23-0454.

Two sets of *APL2 Keyboard Decals*, SC33-0604, are included with this product. Additional sets of these decal sheets can be ordered from IBM.

One of the following:

- Program Directory for APL2 for use with MVS/ESA/SP Version 4 and MVS/SP Versions 1-3
- Program Directory for APL2 Application Environment for use with MVS/ESA/SP Version 4 and MVS/SP Versions 1-3

For all systems:

- *System Modification Program Extended (SMP/E) User's Guide*, SC28-1302
- *System Modification Program Extended (SMP/E) Reference*, SC28-1107
- *TSO Extensions Command Reference*, SC28-1307
- *TSO Extensions Programming Services*, SC28-1364
- *TSO Extensions Version 2 Command Reference*, SC28-1881
- *TSO Extensions Version 2 Programming Services*, SC28-1875

Assembler Language

- *OS/VS–DOS/VS–VM/370 Assembler Language*, GC33-4010

DATABASE 2 (DB2)

- *IBM DATABASE 2 General Information*, GC26-4373
- *IBM DATABASE 2 Command and Utility Reference*, SC26-4085

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Data Facility Hierarchical Storage Management

- *DFHSM Command Reference*, SH35-0083

Graphical Data Display Manager (GDDM)

- *Graphical Data Display Manager (GDDM) and Presentation Graphics Feature (PGF): General Information*, GC33-0866.
- *Graphical Data Display Manager (GDDM) Installation and System Management for MVS*, GC33-0872

IBM 3800 Printing Subsystem

- *IBM 3800 Printing Subsystem Programmer's Guide*, GC26-3846
- *IBM 3800 Printing Subsystem Model 3 Programmer's Guide: Compatibility*, SH35-0051

Interactive System Productivity Facility (ISPF)

- *Interactive System Productivity Facility (ISPF) Version 2 Dialog Management Services and Examples*, SC34-4156

MVS/ESA Version 3

- *MVS/ESA JCL Reference*, GC28-1829
- *MVS/ESA System Programming Library: Initialization and Tuning*, GC28-1828
- *MVS/DFP: Utilities*, ST00-4612

MVS/ESA Version 4

- *MVS/ESA JCL Reference*, GC28-1654
- *MVS/ESA Initialization and Tuning Reference*, SC26-1635
- *MVS/DFP Version 3.3: Utilities*, SC26-4559

MVS/ESA Version 3 or Version 4

- *MVS/DFP Access Method Services for Integrated Catalog*, SC26-4562
- *MVS/DFP Access Method Services for VSAM Catalog*, SC26-4570

MVS/SP1

- *MVS/370 Access Method Services for VSAM Catalog*, GC26-4059
- *OS/VS2 MVS JCL*, GC28-0692
- *OS/VS2 MVS System Programming Library: Initialization and Tuning Guide*, GC28-0681
- *OS/VS2 MVS Utilities*, GC26-3902

MVS/XA

- *MVS/XA Access Method Services for VSAM Catalog* , GC26-4075
- *MVS/XA Access Method Services for Integrated Catalog*, GC26-4019
- *MVS/XA Data Administration: Utilities*, GC26-4018
- *MVS/XA JCL Reference*, GC28-1352
- *MVS/XA System Programming Library: Initialization and Tuning*, GC28-1149

Resource Access Control Facility (RACF)

- *Resource Access Control Facility (RACF) Command Language Reference*, SC28-0733

SCRIPT/VS

- *Document Composition Facility SCRIPT/VS Text Programmer's Guide*, SH35-0069

TCP/IP

- *TCP/IP Version 2 for VM: User's Guide*, SC31-6081
- *TCP/IP Version 2 for MVS: User's Guide*, SC09-1255

VS APL

- *VS APL for CMS and TSO: Writing Auxiliary Processors*, SH20-9068

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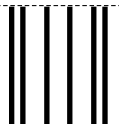

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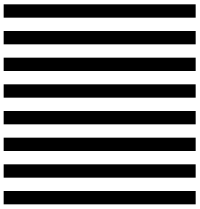

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